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THE THERAPEUTICS OF THE INTERNAL SECRETIONS.*

By Francis P. Kinnicutt, M.D.,

PROFESSOR OF CLINICAL MEDICINE, COLLEGE OF PHYSICIANS AND SURGEONS, MEDICAL DEPARTMENT OF COLUMBIA UNIVERSITY, NEW YORK.

The various theories which have been deduced from experimental, pathological, and clinical observations of the functions of the ductless glands, together with a review of the results of therapeusis in their various diseases, based upon such theories, will be presented in this paper.

Although it has long been surmised that the secretions of the ductless glands were of vital importance to the bodily economy, it is only lately that they have been shown to rival in their *rôle* the part played in metabolism by the glands provided with ducts, such as the liver and pancreas.

The Thyroid Gland. Experimental, pathological, and clinical investigations have demonstrated the vital importance to the economy of the physiological function of the thyroid gland. Defective development, pathological changes, destructive or otherwise, and experimental removal, induce a train of well-known symptoms which necessitate the acceptance of one of two theories as to the nature of its function:

1. That its office is chiefly, if not wholly, a secretory one; that it furnishes some material which enters the blood, probably through the lymphatics, and which is essential for the chemistry of metabolism and for the proper nutrition of the various tissues.

2. That its function is to neutralize or destroy certain poisons which

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result from tissue-changes, and which, by their tendency to accumulate in the blood, induce autointoxication.

The arguments, and they are many, which may be advanced in favor of either one of these theories, will be more properly considered in the papers devoted to the physiological and pathological aspects of the subject. Experimental and clinical observations have demonstrated that the *specific* function of the gland, whether it be to aid metabolism or to develop an antitoxin, can be replaced by a suitable dosage of extracts or preparations of the normal gland administered subcutaneously or by the digestive tract. If the specific purpose of the gland is antitoxic, it is thus evident that this function can be effectively exercised in the blood-current or tissues, even if normally it is partly or chiefly effected within the gland-substance.

In diseases, therefore, which have been shown to be due to a loss of function of the thyroid gland, myxœdema, cretinism, both sporadic and endemic, and operative myxœdema (cachexia strumipriva) the indication for treatment is direct, and the results are among the most brilliant examples of the value of a therapeusis which is based upon experimental pathology.

The number of cases of myxœdema treated with the thyroid preparations is already very great, and experience justifies the formulation of many practical rules in this method of therapeusis. The most important of these rules were to be inferred from the pathology of the disease. Although the myxœdematous symptoms are speedily removed by the treatment, a discontinuance of the treatment is certainly followed by a return of the myxœdema at varying intervals, showing that the treatment does not cause the gland to resume its function, but exercises its influence by introducing into the economy something which it is presumably the function of the gland to supply. It has been shown conclusively, first, that complete recovery can be effected even after the disease has existed for as long a period as fourteen years and in the case of patients bed-ridden and presenting the gravest symptoms; and, secondly, that the maintenance of health can only be secured by continuous treatment during the lifetime of the patient. The requisite dosage after the removal of the myxœdematous condition has been found to vary, and depends upon the degree of loss of glandular function. Equally good results are obtained from a single daily dose or a larger dose given at longer intervals. It has been found that this interval rarely can exceed a week.

The complete restoration of physical strength, aside from the general well-being of the patient, is well illustrated in a case of Murray's,[1] a male, who from being practically disabled, at the end of two years after the beginning of treatment was able to make the ascent of a mountain 3000 feet high, including a walk of ten miles, without any undue fatigue.

It may be of interest to refer to the subsequent history of a woman, forty-three years of age, under my personal care, who was among the first to be treated by thyroid preparations in this country (1892). The disease had existed for twelve years; she had been bed-ridden for a year; she had lost her hearing, was hairless, and suffered from marked mental hebetude and grave physical prostration. After the marvellous improvement usually effected in the first few weeks of treatment she continued to improve, and for the past two years she has admirably filled a responsible librarian's position in addition to performing easily all the duties of the head of a household. Her hearing is perfect; she has a new growth of hair of the finest fibre reaching to her waist, and the brilliant coloring and texture of skin rarely seen except in youth. She maintains her present condition of health by taking the equivalent of five grains of the fresh sheep's thyroid twice weekly.

Cretinism, sporadic and endemic. Continued experience during the few years which have elapsed since the treatment of cretinism with thyroid preparations was first instituted has confirmed the hopes which were originally entertained of its efficacy. It has been shown conclusively, first, that in sporadic cretinism the myxœdematous symptoms can speedily be removed, thereby effecting a marvellous improvement in the frightful deformities incident to the disease; secondly, that the treatment is capable of developing the natural tendencies of the growth of the skeleton which were in abeyance, and that this latent capacity is in apparent inverse ratio to the age of the patient; thirdly, that a striking improvement in the mental condition is effected, although occurring more slowly and in a similar inverse ratio to the age of the patient, as observed in the skeletal growth. The rate and degree of the growth of the skeleton at different ages are strikingly illustrated in the cases of cretinism reported by Thomson[2] at the last meeting of the British Medical Association. In the case of a child, five years of age, who was seven inches below the normal height at the beginning of treatment, the growth was five and three-quarters inches in the first year of treatment, four and one-quarter inches in the second year, and two and one-half inches in the third year. In a girl of eighteen years the growth was four and three-quarters, two and three-eighths, and one and three-eighths inches in the first, second, and third years respectively. And, finally, in two adult cretins, thirty-six and thirty-nine years of age, the growth in one was three-quarters of an inch and five-eighths of an inch in the first and second years, and none in the third; in the other, one and seven-eighths and three-quarters of an inch represented the growth in the first and second years, and there was no further growth in the third. These results are very similar to those reported by many other observers.

The radiograph has been utilized by Hertoghe for purposes of prognosis in cases of this kind. The completeness or incompleteness of ossi-

fication, demonstrable in this way, indicates the possibility of further skeletal growth.[3]

An interesting point in the skeletal growth is that, as the child approaches the height normal at a definite age, continuous growth apparently is only at the usual rate. In the very rapid growth of the bones a tendency to softening, resembling that which occurs in rickets, has been noted by several observers, and has been ascribed to the use of doses of the thyroid extracts which were probably too large. It is, perhaps, too soon to speak positively of the degree of mental improvement attainable; but already cases of cretinism in children have been reported where the intelligence after three years of treatment has compared favorably with that of normal children of a similar age.

In view of the facts related it is not unjustifiable to conclude that the treatment of cretinism with the thyroid preparations, if initiated early in the disease and systematically continued, holds out every promise of the child's development into a healthy adult.

The therapeutic value of thyroid preparations in cretinism has suggested their use in cases of idiocy more or less resembling in bodily and mental defects the cretinous condition.

Bourneville has shown that the weight of the thyroid gland varies very considerably in different cases of idiocy.

Telford Smith[4] has tried the treatment in idiots belonging to the Mongol type, who most closely resemble the cretin. His experience has been that a physical and mental improvement occurs, and that it is inversely to the age of the patient; that the improvement is neither so rapid nor so marked as in the cretin. There is some improvement in the condition of the skin; it desquamates, but does not become normally smooth; chronic marginal blepharitis improves and in some cases is cured. Growth improves as well as the mental condition.

Goitre. Turning from a consideration of the thyroid treatment in pathological conditions necessarily involving a loss of function of the thyroid gland to other morbid conditions in which its function may be variously affected, goitre first attracts our attention.

The benefit derived from the use of the thyroid preparations in cases of goitre in which the absence of constitutional symptoms indicates that the function of the thyroid gland is still largely preserved, has not been satisfactorily explained. The benefit consists in a retrogression of the goitre through atrophy of the hyperplastic and adenomatous tissues.

The maximum improvement is obtained in goitre of the simple hyperplastic form, although adenomatous nodules in many instances shrink in a striking manner. Large collections of colloid and cysts are apparently unaffected by the treatment. The diminution in the size of colloid goitres Kocher attributes to a shrinking of the parenchymatous tissue in which the colloid is imbedded. Although marked diminution in size

in the varieties of goitre which have been mentioned, and a corresponding improvement in the patient's general condition, occur, complete disappearance of the tumor has rarely been noted. The reports of various observers of the permanent improvement or cure are not sufficiently full to justify positive statements on these points at the present date. Recurrence of the tumor after partial or complete disappearance, at varying intervals after the discontinuance of the treatment, certainly occurs in many instances, and suggests the possibility that continued use of the thyroid preparations in a modified way for indefinite periods may be found necessary.

Bruns has reported 60 cases,[5] non-malignant and non-cystic in character, treated by this method; 14 were cured, 29 were improved, and 17 were not benefited by the treatment.

In 21 cases reported by Knoepfelmacher,[6] in 11, the patients varying from two to seventeen years of age, the retrogression of the goitre was marked, although in none was it completely removed; of these, 9 cases were of the hyperplastic type. In 5 other cases of colloid goitre a perceptible diminution in the size of the tumor was effected. In the remaining 5 cases no improvement was observed.

Angerer[7] has treated seventy-eight cases with thyroid preparations, and claims that in all the cases in which the treatment was tolerated and continued for a period of several weeks diminution in the size of the goitre was attained. The most striking results were noticed in the soft goitres of the simple hyperplastic form, and especially in those occurring about the age of puberty. In cystic goitres, through the atrophy of the hyperplastic tissues, the cysts became more superficial, and their enucleation was thereby rendered more simple.

In eighty-three cases of Stabel's improvement was obtained in 92 per cent. In only two was there unquestionably permanent recovery. Stabel[8] states that after the administration of thyroid substance was discontinued the tumor, in cases in which it had decreased, again began to increase in size at varying intervals of four to six weeks.

In explanation of the action of thyroid gland preparations in goitre, Bruns, Ewald, and others have suggested the hypothesis of a primary toxæmia of unknown origin, which evokes an increased functional activity of the gland, accompanied by hypertrophy. If the demand for thyroid products is supplied artificially, the gland retrogrades and atrophy results.*

Exophthalmic Goitre. *A priori*, benefit would not be expected from the thyroid preparations in exophthalmic goitre, as increased functional activity of the thyroid gland probably occurs in this disease, and the

* Bauman's isolation of an iodine-bearing compound (iodothyrine) from the thyroid gland secretion suggests an explanation of the value of iodine in the internal treatment of goitre.

preponderance of evidence indicates that their use is commonly attended with an aggravation of the symptoms.

In certain cases, however, the employment of thyroid extracts is unattended with any appreciable effect. The natural fluctuations of the disease, improvement alternating with recrudescences, suggest that the exceptional reports of *improvement* under this treatment have been based upon insufficient grounds.

Finally, the thyroid treatment has been employed in various pathological conditions in which a perversion of the function of the thyroid gland has yet to be proved.

Without such perversion it is probable, from the power of the active principle to quicken metabolic processes, that the treatment would be of value.

Insanity. The use of thyroid preparations in the treatment of various forms of insanity was originally based upon its undoubted power to increase ultimate cell-metabolism.

A relatively large number of cases treated by this method have been published. Bruce[9] has reported 60 cases, 25 males whose ages ranged from twenty to fifty-five years, and 35 females whose ages ranged from twenty to fifty years. Of the males 7 recovered under treatment, and there were 17 recoveries among the females. Thirteen of these latter were either puerperal, lactational, or climacteric cases.

Bruce believes that the action of thyroid in insanity is a complex one:

1. That the feverish condition induced by it is of benefit to the patient.

2. That it acts as a direct cerebral stimulant.

3. That it supplies some material necessary to the economy which the gland is supplying in insufficient quantity.

Babcock has published twenty-two cases treated in the St. Lawrence State Hospital for the Insane.[10] In four cases there was recovery; in eleven, improvement. The four recoveries were in patients suffering from recurrent mania and melancholia. Improvement was obtained in cases of acute mania and acute melancholia, in two cases of acute delirium, in a case of chronic mania, and in one of chronic melancholia. Relapses occurred in four cases. In one of these (chronic melancholia) relapses followed two successive treatments.

Allen Starr's[11] extensive experience has led him to place the highest value upon the treatment* in a form of mental disturbance occurring at the climacteric. He describes it as a mental depression with anxiety and morbid fears, but without delusions or insomnia. Starr is inclined

* Clouston says "that large doses of thyroid are of marked benefit in cases which threaten to become chronic, and that no case should be allowed to become incurable without a trial of this method of treatment."

to believe that a functional disturbance of the thyroid and ovaries is associated in these cases.

These results correspond closely with those obtained by various other observers and indicate a decided advance in the therapeusis of certain forms of insanity. The favorable or unfavorable response to the treatment is even accepted by several distinguished alienists as affording a basis for prognosis in the large class of cases occupying "the borderland" between curable and incurable states.

Obesity. The literature of the thyroid treatment of obesity is already very voluminous. The number of published cases treated by this method during the past four years is large, and the results in general have been favorable.

The researches of Treupel, Grawitz, Roos,[12] and Hennig, among others, have shown that under the influence of the active principle there is a decided increase in the excretion of nitrogen as compared with the amount received in the diet.

In the discussion in the Fourteenth Congress for Internal Medicine Ewald stated that the thyroid preparations influenced metabolism *in toto*, without a selective action on the fats, and hence that there was an albuminoid waste which should be compensated for by an appropriate diet. In certain cases he had found the treatment to be without effect, an experience which harmonizes with that of other observers, and that its failure was observed not only in the class of patients which accumulated fat in spite of a careful dietary, but also where the obesity is the result of excessive indulgence. In such cases the fatty deposits lie beyond the limit of the control of the oxidation processes.

In patients who react to treatment the loss of weight varies from 1 to 5 kilogrammes (2 to 11 pounds) a week, without restriction of diet, but after a time a limit is reached beyond which further reduction is not obtained. The loss of weight is more rapid during the first days of treatment than later; subsequently it varies in amount from week to week, without explainable reason, the conditions of life remaining the same. The loss is usually unattended with any disturbance of health. As a rule, the discontinuance of treatment is quickly followed by an increase of weight, which shortly reaches its former level. Only exceptionally is the improvement maintained for any considerable period, although careful dieting and exercise prolong its duration.

Cutaneous Diseases. The expectations originally entertained of the value of thyroid treatment in diseases of the skin have not been fulfilled. Only in psoriasis has some small measure of success been obtained. Even in this disease the effects are uncertain; it is impossible to differentiate the type of the affection in which benefit may be expected, and in many cases an aggravation of the lesions occurs.

Phthisis. The suggestion of the possible value of thyroid prepara-

tions in phthisis rests on the slender basis of their temporary effects in some cases of lupus, upon the assumed antagonism of goitre and tuberculosis, and finally upon the atrophy of the thyroid gland in chronic, wasting diseases. Morin[13] and Kraus claim favorable results from their use.

As early as 1893 the treatment was instituted in my hospital wards in carefully selected cases of pulmonary tuberculosis, and the conclusions reached were that it was absolutely without effect either upon the lesions or the general condition of the patient.

The use of thyroid preparations has been further extended, and claims of their therapeutic value in various other morbid conditions have been made.

Further careful investigation and corroboration are demanded before they can be finally accepted.

Attempts have been made by various investigators to isolate the specific principles of the thyroid. Exclusive of Fränkel's discovery of a substance of active properties, but which does not prevent the occurrence of the chronic cachexia, Baumann has isolated an iodine-bearing compound of albumin and globulin, which he has named "Iodothyrine."[14] He believes it to represent the total specific activity of the glandular extract, which he makes dependent upon the amount of iodine it contains.

R. Hutchinson[15] has within the last few months published the results of his investigations into the active principles of the thyroid, which in the main corroborate those of Baumann. He finds that the thyroid contains two proteids, viz., a nucleo-albumin and a colloid matter; the former is small, the latter large in amount. The colloid contains a small amount of phosphorus and a considerable proportion of iodine. On gastric digestion it splits up into a non-proteid and a proteid portion, both of which contain iodine, but chiefly the non-proteid portion.

The colloid matter is the only active constituent of the gland in a specific sense. Both the non-proteid and the proteid portions of the colloid are active, but the former (apparently identical with Baumann's iodothyrine) is much more so than the latter.

The Adrenals. With the exception of Tizzoni's[16] notable experimental investigations, from which he concludes that the adrenals are functionless and derive their importance from their anatomical relation to the sympathetic, all modern work strongly indicates that they are functionally active glands.

The theories advanced in regard to the nature of their function are:

1. That their office is to neutralize or destroy certain toxins and effete blood-pigments which are constantly accumulating in the blood; that their function is excretory.

2. That their function is a secretory one; that they elaborate some

substance which enters the circulation and which is necessary to the economy.

Excretory theory. The excretory theory is based largely upon the apparent toxicity of the blood of animals deprived of their adrenals;[17] upon the respective effects of injections, into the peritoneal cavities of rabbits, of solutions of nicotine which had been kept in contact for varying periods with fresh adrenal tissue, and solutions of nicotine of the same strength with or without contact with muscular or renal tissue (Charrin and Langlois[18]); upon the effects of atropine upon completely acapsulated animals (Abelous[19]); and finally upon the results obtained in guinea-pigs, normal and monacapsulated, by the injections of both sterilized and virulent cultures of the bacillus pyocyaneus (Langlois and Charrin[20]).

The conclusions of these observers are that the functions of the adrenals are to produce one or more substances designed to neutralize or destroy the toxins normally arising from muscular metabolism, and, perhaps, also certain poisons accidentally introduced from without, including those of bacterial origin.

Secretory theory. The secretory theory is based upon the physiological effects obtained experimentally by subcutaneous and intravenous injections of extracts of the adrenals.

Cybulski,[21] from an extended series of experiments, concludes that the adrenals furnish an indispensable secretion which diffuses continuously from the glandular parenchyma, more especially of the medullary substance, into the blood-current, its office being to maintain the activity of the vasomotor centres, the vagi and accelerator nerves, the respiratory centre, and with great probability, also, the centre which maintains muscular tonus.

He claims that the active principle can be extracted by alcohol or glycerin and a variety of other solvents, that it is not destroyed by boiling, and will dialize. If the gland is boiled previous to extraction, it will not yield its active substance to water; or if it be dried at a temperature of 110° C., the alcoholic extract is inert and the watery very much weakened. When introduced into the veins of an animal it causes a marked but very brief increase in blood-pressure and a slowing and increase in force of the heart-action, with diminished respiratory efforts. This effect is never obtained from similar preparations from the brain, spinal ganglia, lymph-glands, liver, spleen, kidney, testicle, or thyroid of the calf and ox.

By an independent series of investigations Schaefer and Oliver[22] have arrived at essentially the same results. Aside from some disagreement in a few particulars relating to the method of extraction and chemical peculiarities of the active agent, they differ from Cybulski chiefly in holding that the action is exercised directly upon the muscles, and not

through the intervention of the nervous system. They reject the theory that the brief effect and rapid disappearance are due to oxidation, and suggest that the substance may be stored up in the skeletal muscles, and lay particular stress upon the exceedingly minute dosage which suffices to produce the vascular phenomena which they found so prominent.

They agree with Cybulski in localizing the active principle to the medullary portion of the gland.

They conclude from their investigations that the suprarenal capsules are secreting glands which elaborate a material producing striking physiological effects upon the muscular tissue generally, and especially upon the heart and arteries, and that, therefore, one of the main functions, if not the *main* function, is to produce a material which is added in some way or another to the blood, the effect of which is to assist, by its direct action upon the various kinds of muscular tissue, in maintaining that amount of tonic contraction which appears to be essential to the physiological activity of the tissue.

Some very recent work indicates the presence in the adrenals of more than one active principle, and two theories attract our attention:

Mühlmann[22] believes that he has demonstrated the presence of a combination of pyrocatechin in the medullary substance. According to his hypothesis, it is one of the functions of the suprarenal capsules to convert the protocatechuic acid derived from the vegetable elements of diet into pyrocatechin. The latter substance in small doses elevates blood-pressure, while in larger doses it is toxic. The herbivora are less sensitive to its influence, probably as an effect of habituation. Its elimination or conversion into harmless products is believed to be accomplished through the intervention of some unknown activity of the ganglion-cells of the sympathetic. If the latter function fail or the pyrocatechin be produced in excess, toxic symptoms arise, accompanied by an abnormal pigmentation derived from the reaction between the tissues and this substance in the presence of alkalies. The author does not exclude the presence of other active principles and other functions of the gland, but considers his hypothesis to afford the best explanation of the toxic effect of adrenal extracts and the occurrence of pigmentation of adrenal origin.

Gourfein[24] and subsequently Dubois[25] have endeavored to isolate the various active principles obtainable from the suprarenal gland.

Without entering into the complex details of their chemical experiments, it is sufficient to state that Dubois has separated the active principles into two classes. The first is composed of several albumoses which may be precipitated with alcohol and redissolved in water. The substances so isolated have no well-marked toxic effect, but they and they alone seem to possess therapeutic importance, manifested by their influence in diminishing or even preventing the results of the injection of muscle-toxins. He regards these antitoxins as diastases or substances

endowed with an inherent dynamic activity which cannot be isolated from the protoplasmic bodies with which it is associated. The second class is composed of bodies which resemble in their constitution and reactions the alkaloids. They have a marked degree of toxic effect, and are identical in some of their reactions with the muscle-toxins. This leads the author to favor the theory that the suprarenal bodies, like the liver, occlude the products of organic waste and modify them *in loco* by the action of special diastases.

Dubois concludes that the chief function of the suprarenal capsules is to destroy the toxins in circulation, especially those resulting from muscular waste and perhaps those furnished by the nervous tissue; that they do not seem to secrete any special substance destined to enter the general circulation, but that their cellular protoplasm possesses a special diastatic property, non-toxic, which seems to modify certain poisons, organic and bacterial, yet this action requires time, and proceeds little by little; that in normal conditions there are always alkaloids present, especially in the medullary zone, which possess an intense toxic action upon both striped and unstriped muscular fibre, and upon certain nervous elements not yet fully defined; that it is the retention of these excrementitious products which brings about serious symptoms; that their quantity may vary under the influence of numerous conditions; and that no positive therapeutic results can be obtained until we are able to separate definitely and completely the toxic and the antitoxic principles which coexist in the suprarenal capsules, as glycogen and its ferment coexist in the liver.

On the basis that the adrenals are functionally active, the employment of adrenal preparations has been advocated in pathological conditions necessarily attended with loss of function of these glands.

I have been able to collect forty-eight cases of Addison's disease treated with various adrenal preparations. They have been tabulated with brief notes of their salient points. Six patients are reported as cured or practically well, 22 improved, 18 unimproved, and in 2 instances an aggravation of the symptoms is stated to have occurred during treatment.

Among the six recoveries, in one instance the patient has remained well for four months; in a second case the treatment was continued for four and one-half months, the pigmentation disappeared, and the patient was able to return to work. He is still under observation one year and a half after the treatment was instituted, and is still well. In a third case the patient was practically well at the date of the last report, twelve months after the beginning of treatment.

In the cases in which improvement was noted relapse and death occurred in one; in another the improvement was only temporary, death following; in a third case, the treatment was irregular, and the patient was relapsing at the date of the last report. In a fourth case

improvement in the asthenia and pigmentation was observed until the end of the fourth week, when, the appetite failing, treatment was suspended, and death occurred two weeks later. In another patient there was marked improvement during regular treatment. During the subsequent months the treatment was irregularly pursued, and eight months later the patient was reported as failing rapidly. In Bramwell's case there was remarkable improvement for a year, the patient being able to resume his ordinary occupation, when death occurred. In still another case improvement had been maintained for twenty months at the date of last report. The patient had been able to return to work, but relapses occurred when the treatment was suspended. Finally, in one case there was improvement for three months, when the patient died quite suddenly on the discontinuance of the treatment.

In many of the cases related the association of adrenal disease with grave tuberculous lesions elsewhere in the body precluded the possibility of obtaining more than an amelioration of symptoms; nevertheless, the results secured justify the hope that perhaps with the isolation and differentiation of the several active principles, if several there be, of the glandular structures, an efficient therapeusis may be obtained for the simple atrophies and fibroid degenerations of the adrenals, which it has been demonstrated may be both localized and provocative of some of the phenomena of so-called Addison's disease.

The rise of blood-pressure produced by the active principle of the adrenals, through its action either directly or indirectly upon the muscular walls of the bloodvessels and the heart-muscle, has suggested the possible therapeutic value of the adrenal preparations in pathological conditions other than those necessarily attended with loss of function of the gland.

Where the vasomotor tone is lowered, as in asthenia and anæmia, their use would seem to be indicated, and Oliver[26] claims benefit has been noted. In cyclic albuminuria he also states that he has obtained good results from their employment. Oliver also suggests their probable value in heart-failure, as there seems to be some resemblance between the physiological action of the active principle and that of digitalis. In a few cases of this kind adrenal extract has very recently been tried in my hospital wards, and with apparent benefit. The rapid rise in blood-pressure was distinctly shown by the sphygmograph, and was also appreciable to the finger. Further study is necessary to determine their true therapeutic value in the conditions mentioned.

Schaefer and Oliver's investigations indicate that the active principle is not unfavorably influenced by gastric digestion; hence that the various preparations properly may be administered by the mouth, and again, that comparatively large doses may be given to man with safety. A daily dosage equivalent to 45 grains of the fresh gland is recommended

for therapeutic use. It can be given continuously for very long periods without injurious effect.

Thymus Gland. The determination of the true physiological position of the thymus gland in the human economy is especially difficult on account of the several histological phases in its natural history.

Closely related to the thyroid gland in its manner of origin, the structure of glandular epithelium of the first four months of intrauterine life gradually gives place to a lymphadenoid structure which reaches its maximum development at birth. This lymphadenoid thymus is normally present until the period of puberty, when it is gradually replaced by the lobulated fatty thymus, which persists indefinitely in man.

It would, therefore, seem that the existence of a secretory function is presumable only in the first months of intrauterine life. Whether the function of the lymphadenoid thymus differs from that of other lymphadenoid structures yet remains to be determined. The discovery by Baumann of minute amounts of an iodine-bearing compound in its tissues,[27] a substance not found in other organs, with the exception of the thyroid gland, is suggestive.

It is thus evident that the physiological basis for the therapeutic use of thymus gland is a slender one.

Clinically, the original employment was accidental, and explanations of its action at present must be regarded as largely speculative.

Owen's published case of exophthalmic goitre,[28] in which benefit was observed from feeding with thymus gland which had been used by mistake for thyroid, introduced the thymus treatment of this disease.

I have collected 62 cases of exophthalmic goitre treated by this method. In 36 cases improvement of varying degree occurred; in 25 there was no improvement, and in 1 there was an aggravation of symptoms, resembling in all respects that commonly caused by thyroid feeding in this disease. In one of the unimproved cases a combination of thymus and thyroid was employed at first, and later the thymus alone was given until a few days before death.

In the cases of improvement the effect upon the more characteristic symptoms was as follows:

Exophthalmos: the exophthalmos disappeared in 8 cases; in 1 it nearly disappeared; in 8 it was diminished in amount; in 1 it is stated that the patient was practically cured; in 6 the symptom is not mentioned; and in 12 there was no effect.

Goitre: in 4 cases a slight enlargement of the thyroid gland disappeared; in 12 the size was reduced; in 13 there was no effect; in 7 the goitre is not mentioned.

Pulse-rate: in 17 cases the pulse-rate was reduced; in 3 of these the reduction was very slight. In 13 cases there was no diminution in the frequency of the pulse; in 6 cases the symptom is not mentioned.

In a large proportion of the 36 cases it is evident that there was an improvement in the subjective sensations, and in many in the general condition, including a gain in weight. In the remaining 26 of the 62 cases either no beneficial effect was observed or an aggravation of symptoms occurred.

It is desirable to compare the favorable results which have been described with those obtained by other methods of treatment.

McKenzie[29] has carefully contrasted twenty cases of exophthalmic goitre personally treated by him with thymus preparations, either alone or combined with other remedies, with a similar number also personally treated by other methods. As regards the pulse-rate, "there was nothing in favor of the thymus treatment." The goitre became materially smaller in three cases under thymus treatment; in two it increased, and in another it increased after first diminishing. In the remaining cases it remained practically unchanged.

In the *contrast*-cases the goitre diminished in four; in a fifth it entirely disappeared; in one case it increased; in the remainder no change was observed. Under the *thymus* treatment proptosis decreased distinctly in only one case, and in this instance a reduction had begun before the thymus was given. In the *contrast*-cases the exophthalmos disappeared in three.

McKenzie's conclusions are that the thymus gland possesses no specific action in exophthalmic goitre; that "in most cases it has no effect upon the heart, goitre, or proptosis." At the same time he believes it to be "a remedy of some value, improving the general condition, and in this way assisting toward recovery." He places it in the same class of remedies as cod-liver oil.

In two severe cases carefully observed from day to day in my hospital wards for the past five months, in which the thymus treatment alone was used for two months, and other methods subsequently, the former treatment was without the slightest beneficial effect upon any symptom. In one the thyroid increased by an inch during the thymus period. In contrast, in one of these cases there was marked improvement in the tremor, a diminution in the pulse-rate, a reduction in the goitre of an inch, with improvement in the general condition, accompanying the use of bromides and belladonna, to be followed again by a recrudescence of the symptoms.

Maude,[30] in reporting four cases treated with marked benefit with thymus preparations, remarks that he "cannot claim that the rapidity and maintenance of improvement have been more than might occur under other treatment, or none at all."

In judging of the therapeutic value of the thymus treatment in exophthalmic goitre too much reliance should not be placed upon the relative number of published cases of successes and failures. Favor-

able results from a new remedy are more frequently reported than failures.

Finally, in few diseases is it as difficult to speak positively of the value of any particular method of treatment. The natural fluctuations of the disease are great, and improvement and recrudescence occur often in an unexplainable manner.

Goitre. Mikulicz[31] has reported thirty cases of goitre treated with thymus extracts. In twenty cases the goitre underwent a decided reduction, as ascertained by exact measurements, and subjective improvement followed. Among these are several cases which had only slightly improved or which had become worse under thyroid treatment. A complete cure in the anatomical sense was only obtained in two cases. With the exception of one case (mixed nodular and diffuse parenchymatous) they were all diffuse hyperplastic tumors. Five of the unsuccessful cases were of the nodular, and five of the diffuse hyperplastic form.

The mode of action of the remedy remains a matter of speculation. It is possible that the active principle is an iodine compound, which Baumann was able to isolate in the case of the thymus as well as the thyroid gland.

In view of the possible stimulation of the nutritive processes in exophthalmic goitre by the thymus extracts, it is of interest to study their effects in other diseases attended with impaired nutrition.

With this object in view the treatment was tried in my hospital wards during the past winter in six carefully selected cases of apyretic pulmonary phthisis.

The general condition, weight, and physical signs of the patients were carefully noted for a period before the institution of the thymus treatment. The extract in daily doses of 45 grains, speedily increased to a drachm, was then given continuously for two months, when the usual treatment of the hospital—creosote, the malt preparations, and cod-liver oil—was resumed.

In Case I. (infiltration of one apex) the weight, which had been nearly stationary, increased two pounds during the first three weeks of treatment; there was a loss of six pounds during the subsequent five weeks, when the usual treatment was resumed.

In Cases II. and III. (consolidation at one and at both apices respectively) the weight was stationary prior to treatment. There was a gain of four pounds in each case during the first three weeks, and then a loss of eight pounds in one case and two pounds in the second case in the subsequent five weeks. In the following two months, under ordinary treatment, in the case showing the greatest loss, there was a gain of two pounds; in the other there was no gain.

In Case IV. (consolidation at both apices) there was a gain of two and one-half pounds in the first two months, and then a loss of three

and one-half pounds in the succeeding two months under other treatment.

In Case V. (infiltration at one apex) a gain of seven pounds in three weeks was followed by a loss of four in the succeeding five weeks, which was again followed by a gain of two pounds in the seven weeks subsequent to the discontinuance of the thymus.

Finally, in Case VI. (consolidation at both apices) there was a gain of a pound in the first week, and a continuous loss, amounting to eight pounds, from this time until other treatment was substituted for the thymus. In five of the six cases it is seen that an increase in weight occurred during the first weeks of treatment. The gain was followed by a loss, varying in amount. In only one case was there no loss in weight during the two months of the thymus treatment.

In all the cases there was little or no change in the general condition and physical signs during the thymus treatment, although at first, as is so often the case with the trial of a new remedy with the knowledge of the patient, expression of improvement in subjective sensations was made.

Whether the favorable response in the first weeks to the remedy, as shown in improved nutrition, may not be referred to the stimulus of hope, permits of speculation.

Pituitary Body. As in the case of the glandular structures already considered, the function of the pituitary body is variously believed to be of a secretory or excretory nature.

Schaefer and Oliver's[32] experimental investigations with decoctions of its tissue indicate that its activity is of a secretory character.

Rapid and great rise of blood-pressure was observed, and it was shown that the action of the active principle was a direct one upon the arterioles and probably so upon the heart-muscles. They conclude from their results that the pituitary body furnishes a secretion to the blood which serves to increase the contractile power of the heart and arteries and to influence the nutrition of certain tissues.

On the other hand, very slight physiological effects, beyond a slight elevation of temperature, slight depression, and some gastro-intestinal disturbance accompanied by emaciation, were noted by Mairet and Bosc in their experimental work.[33]

Marie,[34] who first described the disease acromegaly, regarded by many as dependent upon pathological changes in the pituitary body, believes that the function of the gland is to neutralize or destroy certain toxins whose accumulation in the blood provokes a hyperplasia of connective tissue, including the bony structures.

On the basis of a presumable glandular activity, the use of preparations of the pituitary body has been suggested in acromegaly.

With few exceptions autopsies in cases of this disease have shown

macroscopic lesions of the pituitary; they have consisted chiefly in simple hyperplasias of its structures or of tumors of various kinds with or without apparent change in the volume of its glandular tissue. Tamburini[35] has recently collected twenty-four autopsies in which tumor existed in seventeen, and of the remaining seven he considers the diagnosis of acromegaly to be doubtful in five. In the case of either lesion it is presumable that the function of the gland is affected. Both diminished secretion and hypersecretion have been suggested in explanation of the evolution of the symptoms of acromegaly. Clinical as well as pathological observations may be urged with equal force in favor or in disproof of either of these theories. From the standpoint of pathological anatomy, it may be said that while destructive lesions are the exception, they do occur; and in cases of tumor the absolute volume of the proper tissue of the gland, whether increased or diminished, affords no reliable indication of its functional activity. Experimental reduction of the volume of glandular tissue (Gley[36]) fails to support the theory of secretory failure.

Clinically, in a few cases the administration of pituitary extract has been found to relieve certain of the characteristic symptoms, a result which does not harmonize with the hypersecretion theory; and yet such a result is not necessarily incompatible with it. Still less does it negative the possibility of a hyperactivity of one element in a composite function, the product of which may not be present in the preparation as actually administered.

Marinesco has advanced the hypothesis that some perversion occurs in the composition of the secretion, or that some lack of balance arises between it and the products of the other ductless glands, as a result of which nervous control over the nutritive processes is impaired. In this way provision is made for including both the hypertrophic and the atrophic lesions of the gland.[37]

The idea of a correlated activity of several of the glands jointly influencing nutrition either directly or through the medium of the nervous system, is sufficiently elastic to cover almost any combination of circumstances; but it must be remembered that it is as yet an unproved hypothesis.

Arnold,[38] Dreschfeld,[39] and Dercum[40] go one step further and favor a primary nervous lesion of unknown character, thus reducing the glandular changes to phenomena of the second order.

In conclusion, it may be said that while the whole subject presents an accumulation of theories having an exceedingly slender support on definite findings, it is probable that the pituitary gland bears some unascertained relation to the nutrition of bony and dermal tissues, as a result of which an overgrowth of them accompanies changes in the

gland which presumably affect its functions. Whether these changes are primary is as yet unknown.

A few cases have been reported which indicate a widespread involvement of the glands of internal secretion and suggest a possible common origin. Murray[41] has collected five cases of this kind; in all acromegaly and exophthalmic goitre coexisted, and in four glycosuria also was present, pointing, perhaps, to some perversion of the pancreatic secretion. In the two cases with fatal issue the thyroid and pituitary glands were enlarged, and in one of these the thymus was persistent and hypertrophied.

I have collected thirteen cases of acromegaly treated with pituitary preparations. In seven cases varying degrees of improvement were noted. In one of these the improvement occurred under the combined use of pituitary and thyroid preparations. In five cases no effect was obtained; and in one case the patient was made worse by the treatment.

In two cases of improvement the violent headache and neuralgic pains in the limbs were diminished, and the general condition otherwise improved. There was no diminution in the size of the affected tissues.

In a third case the general condition was improved; no painful symptoms had been present at any time.

In a fourth case, after fourteen days of treatment the patient was able to approximate the teeth better than before, and the patellar reflex on the left side, which had been absent, was restored. Under treatment with thyroid extract for several months previously no improvement had occurred.

In a fifth case it is stated that the patient had greatly improved under treatment.

In a sixth case the patient was treated for two months with thyroid preparations, then for three to four months with pituitary extract, and finally for one and one-half months with combined pituitary and thyroid preparations. The final result was a decided decrease in the measurements of the extremities, an almost complete disappearance of the neuralgic pains, and an improvement in the general condition.

Finally, in the seventh case, there was an improvement in the mental condition.

A tabulated report of these cases is appended.

Adrenal Preparations in Addison's Disease.

Observer.	No. of cases.	Results.	Remarks.
Blackader, A. D., Montreal Med. Journ., Nov. 1893, and results from personal letter.	1	Distinct improvement.	Under treatment four weeks; energy and power of endurance greater; bronzing of skin less marked.
Chauffard, La Semaine Méd., 1894, p. 74.	1	Not improved.	
Abelous, Langlois, and Charrin, Arch. de Physiol., 1892, p. 721.	1	Not improved.	Patient profoundly tuberculous; death followed in a short time.
Sée (Germain), quoted by Abelous, Langlois & Charrin, Arch. de Physiol., 1892, p. 721.	1	Not improved.	Death shortly after from general tuberculosis.
Langlois, Bra. Methode	1	Improvem't in asthenia.	Passed out of observation at end of one month.
Brown-Séquard, p. 546. Presse Méd., 1896, p. 1181.	1	Not improved.	Patient soon declined to be treated on account of pain at seat of the injections.
Lloyd-Jones, Brit. Med. Journ., 1895, ii. 483.	1	Improved.	
Francis, Brit. Med. Journ., 1896, i. 1088.	1	General improvement; cutaneous pigmentation lessened; pigment in mouth unchanged.	Improvement continued for several months, followed by relapse and death.
Dyson, Quart. Med. Journ., 1894, iii. 43.	1	Not improved.	Very advanced case.
Sansom, Brit. Med. Journ., 1895, ii. 1235.	1	Improved.	"Subjective symptoms improved wonderfully." Treatment was irregular, and at date of report patient was relapsing.
Althaus, Brit. Med. Journ., 1895, ii. 1235.	1	Improved.	Improvement only temporary, followed by death.
Stockton, Med. News, 1895, lxvii. 551.	1	Cured.	Pigmentation almost removed, and general condition practically restored to normal.
Murrell, Lond. Lancet, 1896, i. 289 (also Parkinson, Brit. Med. Journ., 1896, i. 150).	1	Not improved.	Asthenia and pigmentation three months; under treatment for the following six weeks, at the end of which death occurred.
Shoemaker, Univ. Med. Mag., Feb. 1895, p. 309.	1	Improved.	Subcutaneous injections of glycerin extract for two months. Subjective symptoms restored to normal, pigmentation about as before.
Turney, Brit. Med. Journ., 1896, i. 150.	2	Not improved.	Very advanced cases. One patient lived only two days; the other only two weeks.
Oliver (Thomas), Internat. Clinic, 1894, ii. 23.	1	Not improved.	
Ringer and Phear. Clin. Soc. Trans., xxix. 68.	1	Improved.	Asthenia and pigmentation improved until the end of the fourth week, when the appetite failed, and treatment was suspended. The patient died two weeks later.

Observer.	No. of cases.	Results.	Remarks.
Tonoli, Gaz. Med. Lomb., xlv. 321.	1	Cured.	Treatment with powdered adrenal tissue for two months.
Shattuck, report by Cabot, Med. News, 1896, lxix. 281.	1	Apparently well.	Has remained apparently well for four months.
Stewart (T. G.), rep. by Duckworth, 20th Cent. Pract., ii. 24.	1	Not improved.	
Spillmann, Rev. Méd. d.l'Est., 1896, xxviii. 44. Rev. des Sci. Méd., 1896, xlviii. 86.	3	2 not improved. 1 improved.	Subsequently relapsed.
Osler, Internat. Med. Mag., Feb. 1896. Johns Hopkins Bul., 1896, p. 208.	1	Markedly improved.	Gained weight, strength fully restored, pigment has disappeared from palate, but not changed on integument. Eight months after the original report the patient, who has meanwhile been treated without much regularity, is said to be failing rapidly.
	1	Not improved.	Died on the seventh day of treatment.
Oliver (George), Brit. Med. Journ., 1895, ii. 561, 653.	1	Practically well.	Last report at end of twelve months' treatment. This case also reported by Rolleston and by Oliver several times.
	2	Markedly benefited.	One still under treatment at last note, the other lost sight of.
Wood, Univ. Med. Mag., viii. 483.	1 (2 or 3)	Apparently well. (Improvement.)	Immediate improvement in subjective symptoms, after a few months apparently well; bronzing not affected. (Author states that he knows of these cases; no details.)
Stockman, Edin. Med. Journ., Feb. 1897, p. 211.	2	1 no improvement. 1 improved.	Improvement had lasted twenty months at date of report. Patient is able to follow his ordinary occupation, but relapses occur when treatment is suspended.
Maragliano, Riforma Med., 1894, iv. 650.	1	Improvement.	Subjective improvement and increase in muscular strength. Able to walk after the tenth injection (twenty days), although previously bed-ridden.
Pitrés, Cong. de Méd. Int. Bordeaux, 1895.	2	Worse.	Injections caused severe local irritation and aggravation of symptoms.
Faisans, personal com. to Dupaigne, Thèse de Paris, 1896.	1	Improved.	Pigmentation improved, other symptoms persisted.
Dupaigne, Thèse de Paris, 1896, pp. 109, 118.	2	1 no improvement. 1 improved markedly.	An advanced tuberculous case. Improvement in pigmentation and asthenia while under treatment during three months. Died quite suddenly when treatment was suspended.
Epelbaum, Thèse de Paris, 1895.	2	1 improved. 1 improved.	Under treatment only a short time, and subsequently lost sight of: improvement very marked from two weeks' treatment. After two months of treatment was able to return to work.
Dieulafoy, Dupaigne, Thèse de Paris, 1896, p. 131.	1	Improved.	Improved only while under treatment; relapsed promptly each time it was suspended.
Bèclère, Dupaigne, Thèse de Paris, 1896, p. 133.	1	Cure.	Treated with ingestion of fresh gland for one month, and then for three and a half months with subcutaneous injections of extract. Pigmentation disappeared and patient was able to work. Cure had continued one year and a half at date of report, patient remaining under observation.

Observer.	No. of cases.	Results.	Remarks.
Marie, Dupaigne, Thèse de Paris, 1896, p. 136.	1	Improved.	Asthenia less marked.
Bramwell, Brit. Med. Journ., 1897, i. 67.	1	Marked improvement.	Improvement lasted for a year, when death occurred. Asthenia improved so that patient shortly before his death was able to walk eight miles.
Quine, Journ. Amer. Med. Ass., 1896, xxvi. 1012.	1	No improvement.	Treatment only continued twelve days; patient died four days later.
Darier, Ann. de Derm. et d. Syph., 1895, p. 464. See also for termination, Dupaigne, loc. cit. p. 102.	1	No change.	Treatment suspended on fifteenth day on account of local abscess. He died soon after.
Schilling, Münch. med. Woch., 1897, p. 170.	1	Improved.	Three months' treatment; weight rose from 69-99 lbs. Strength fully restored, bronzing markedly diminished. Died three months later with toxæmic symptoms.
Kinnicutt (unpublished case).	1	No effect.	Treatment initiated only with the development of toxic symptoms. Death five days later. Diagnosis confirmed by autopsy: general tuberculosis, tuberculous and fibroid changes in adrenals.

Thymus Therapy in Exophthalmic Goitre.

Observer.	No. of cases.	Results.
Owen (Brit. Med. Journ., 1896, vol. ii. p. 1017)	3	Improved.
Williams (Clinical Journ., vol. vii. p. 93)	1	Worse.
Cunningham (Med. Record, vol. xlvii. p. 742)	3	Improved.
Taly-Guerin (Sem. Méd., 1895, p. 331)	1	Not improved.
Solis-Cohen (Philadelphia Polyclinic, 1896, vol. v. p. 446) .	4	Improved.
Dreschfeld (Practitioner, 1896, vol. lvii. p. 154)	3	Not improved.
Todd (Brit. Med. Journ., 1896, vol. ii. p. 195)	1	Improved.
Maude (Lancet, 1896, vol. ii. p. 173)	4	Improved.
McKee (Brti. Med. Journ., 1896, vol. i. p. 656)	1	Improved.
Edes (Boston Med and Surg. Journ., 1896, vol. cxxxiv. p. 82)	1	Improved.
Mikulicz (Centrbl. f. Chir., 1896, p. 929)	8	1 improved. 7 not improved.
Parker (Brit. Med. Journ., 1897, vol. i. p. 528)	1	Improved.
Lockie (Brit. Med. Journ., 1897, vol. i. p. 529)	2	Improved.
Sutcliff (Brit. Med. Journ., 1897, vol. i. p. 782)	1	Improved.
Metcalf (rep. by Mackenzie, Amer. Journ. Med. Sci., 1897, 132)	2	Improved.
Mackenzie (Amer. Journ. Med. Sci., 1897, p. 132) . . .	20	13 improved. 7 not improved.
Booth, J. A. (personal communication)	4	Not improved.
Kinnicutt	2	Not improved.

Pituitary Treatment of Acromegaly.

Observer.	No. of cases.	Results.	Remarks.
Bard, Lyon Méd., 1892, lxix. 547.	1	No result.	Pituitary extract from rabbit used subcutaneously. Author proposed to continue the treatment with extract derived from ox and sheep, but no further report can be found.
Marinesco, Bull. et Mém. Soc. Méd. des Hôp., 1895, p. 715.	2	Very much improved.	The violent headache and neuralgic pains in the limbs considerably reduced, and the general condition otherwise rendered more satisfactory. No diminution in size of diseased parts. Marked diuresis. Author believes that the treatment exercised an effect either on the pituitary tumor or the cerebral circulation.
	1	Slight improvement.	General condition improved. This patient did not present any painful symptoms.
Mendel, Berl. klin. Woch., 1895, 1129.	1	Improved.	After fourteen days' treatment patient was able to approximate the teeth better than before, and the patellar reflex on the left side, which had been absent, was restored. This case had been treated for several months with thyroid extract without improvement.
Bramwell, Brit. Med. Journ., 1894, i. 21.	1	Improved greatly.	Author states that improvement may have been due to favorable general conditions during hospital residence. Previous treatment with thyroid had failed in this case.
	1	No effect.	Subsequently improved under thyroid.
Thomas, Brit. Med. Journ., 1896, i. 909.	1	No effect.	Refused to continue treatment because it made her "feel queer." Subsequently relieved by trephining.
Dinke, N. Y. Med. Record, 1896, i. 779	1	Marked improvement.	Treatment for two months with thyroid, then for three to four months with pituitary, and finally for one month and a half with thyroid and pituitary combined. The final result was a decided decrease in the measurements of the extremities; pains had almost disappeared, and the general condition was improved. Patient believes that the improvement was due to the thyroid.
Osler, Prin. and Pract. of Med., (1895) p. 1047.	1	Not improved.	
Broadbent, Dodgeson, Lancet, 1896, i. 846.	1	Some improvement.	Chiefly in the mental condition; possibly due to the relief of the obstinate constipation.
Rolleston, Lancet, 1896, i. 1137.	1	No improvement.	Measurements increased. Author attributes the relief in pains and diminution of glycosuria to rest and diet.
Schultze, Berl. klin. Woch., 1896, p. 407.	1	Worse.	Caused irregularity of heart-action, and death followed.

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AN ANATOMICAL AND BACTERIOLOGICAL STUDY OF ACUTE DIFFUSE NEPHRITIS.

By W. T. Councilman, M.D.,
Shattuck Professor of Pathological Anatomy, Harvard University Medical School.

The kidney is a glandular organ, but there is no gland in the body with which it may be compared. The peculiarity in the structure of the kidney lies in its blood-supply and in its structure as a gland. There is in the kidney a structure corresponding to a gland, and leading from this an excretory duct which also has true glandular properties of its own, so that the kidney may be considered as a double glandular organ. The glomeruli have the structure of true glands, with capillary wall, basement-membrane, and differentiated epithelium. The tubule leading from the glomerulus may be considered partly as an excretory duct for that glandular structure, but it has glandular functions of its own as well, and adds various substances to the secretions of the glomerulus. The circulation of the kidney is peculiar in that nearly all of the blood passes first to the glomerulus, and after circulating in the capillaries of this leaves the glomerulus in a single vessel, which again breaks

up into capillaries which are distributed between the tubules. From this it can be seen that any lesions of the glomerulus which in any way interfere with the circulation of the blood in its vessels must exert a marked action on the nutrition and function of the other parts. The glomeruli, tubules, and vessels are held together by delicate interstitial tissue in which there are but few cells. It is only around the larger arteries and veins near the pyramids that connective tissue is in any amount, and in this there are considerable numbers of round cells, which may increase in number in almost all pathological conditions.

There is considerable power of regeneration in the kidney, which becomes less the older the individual. In the normal kidney, not only portions of epithelial cells which are destroyed in the ordinary process of wear and tear form again from the old, but new cells are formed. It is not probable that in the adult kidney portions which are wholly destroyed can be regenerated. Certainly no evidence of such regeneration is seen around the tissue destroyed by an infarction. Hypertrophy of the remaining glomeruli can be seen in kidneys in which there has been extensive destruction, and the same thing is probably true of the tubules.

In order that the kidney may preserve its normal structure and function a number of conditions are necessary. The blood must enter the kidney in the proper manner and under the normal pressure. The circulation of the blood in the kidney must not be impaired. There must be no impediment to the venous outflow. The small veins in the kidney are numerous, the blood-pressure within them is low, and central or local circulatory disturbances easily produce passive congestion. Degenerative lesions of the epithelium are produced not only by the retained venous blood, but the direct pressure exerted on the cells by the enlarged vessels probably has some effect. Free exit must be given to the products of secretion. The ureter has thin walls; it pursues a long course, and is little protected from pressure. There is a series of pathological conditions in the urinary tract which can increase the pressure within the tubules, and this leads to alterations of structure. The character of the blood coming to the kidney must be normal. The blood may contain substances which are directly injurious to the kidney and affect its tissues in various ways.

The diseases of the kidney due to alterations in the character of the blood are the most numerous and the most serious, and their pathology is the most obscure. In a consideration of the lesions so produced it is obvious that we can divide them into classes dependent in part upon the nature of the injurious substance. These substances may be divided into those which are soluble and those which are insoluble. Insoluble substances too large to pass through the capillaries may lodge in some of the vessels of the kidney, and produce lesions in the tissue immediately

around them. All of the lesions produced by insoluble substances are focal in character. Inert substances produce effects solely by cutting off the circulation of circumscribed portions of the tissue, as is shown by the infarction. Infectious substances contain or are composed of bacteria, which, by their growth, are capable of increasing their effects. It is possible to have infected emboli act both mechanically and by infecting the tissue. It is obvious that the bacteria can only enter into the kidney tissue by the bloodvessels or by the urinary passages, and it is frequently difficult to determine from the character of the lesion whether they have entered in either of these ways. If by the blood, they can easily make their way by growth into the tubules, and can be found there, or *vice versa*.

The chief difficulty in the study and classification of diseases of the kidney is found in those which are due to the action of soluble injurious substances; these soluble substances being carried to all parts of the kidney by the blood, produce diffuse lesions, which may be more marked in certain parts of the organ. It may be that the substances act in a special manner on certain histological elements of the kidney, or it may be that in certain parts of the kidney there is diminished resistance to their action due to causes for the most part unknown. Both classes of lesions, the focal and diffuse, may be found in the same kidney. In cases of severe staphylococcus infection focal lesions may be met with around emboli or thrombi of bacteria, and in addition there may be diffuse lesions which are due to the presence in the blood of soluble chemical substances which are produced by the bacteria either in some other focus or in the kidney. In certain of the infectious diseases, notably in diphtheria and typhoid fever, focal lesions in various organs, as in the liver, spleen, and lymph-glands, and to a less degree in the kidney, may be produced by the influence of soluble chemical substances produced by the disease. So that it is impossible to draw an absolutely sharp line between the etiology of the focal and the diffuse lesions of the kidney.

Bright, to whom we owe the first attempt to classify the diseases of the kidney, regarded those pathological conditions associated with albuminuria as representing three stages of the same disease, and as inflammatory in character. Rayer, in 1840, divided the lesions described by Bright into six different forms, and separated the albuminuria, due to venous hyperæmia, from the essential diseases of the kidney. He regarded the process as inflammatory in character. Reinhardt, in 1850, was the first to make a careful histological study of the lesions of the kidney, using the more improved histological methods available at that time. He considered that the different conditions found in the kidney represented different stages of one and the same disease, the small, shrunken granular kidney being the last stage in the process. Frerichs, in 1851, con-

cluded with Reinhardt that the pathological processes in the kidney represented a single disease, and differences in the anatomical appearances were due to different stages of the process. This view as to the unity of the diffuse pathological processes of the kidney was opposed in England by Wilkes in 1850, and in Germany by Bartels in 1875. Wilkes concluded from clinical observations that the large, swollen white kidney did not pass into the small hard; that the lesions in the two conditions were absolutely different, and due to different causes. Bartels calls special attention to the differences in the clinical course of the disease marked by the large white kidney, as distinguished from the small red; dropsy being a prominent feature in the first, and usually absent in the last. Virchow's work on inflammation, in 1852, served to direct observation to the part played by the epithelial constituents, and he introduced the term parenchymatous nephritis to designate those cases in which lesions of the parenchyma are of chief importance. Baer, 1859, described the connective tissue of the kidney. He recognized its presence not only in the pyramids, but in the cortex, and introduced the term "interstitial nephritis" to describe that form of disease in which the lesions are chiefly found in the interstitial tissues. The diseases of the bloodvessels of the kidney were studied by Zeigler, 1879, who recognized a special form of disease—arteriosclerotic nephritis—due to these vascular lesions. Charcot, 1878, partly from clinical, partly from pathological anatomical observations, distinguishes three different forms of nephritis. The first is characterized clinically by a rapid course and diminution in the amount of urine, a large amount of albumin and dropsy, and anatomically by a large white kidney. The second clinically by a chronic course, increase in secretion of urine, a small amount of albumin, and anatomically by the small red, contracted kidney. The third form is the amyloid kidney. Weigert, 1879, published a celebrated article on nephritis in which he separated the diseases of the kidney into those which were solely degenerative and those which were inflammatory. In this article he denies the possibility of inflammatory lesions confined to the parenchyma or to the interstitial tissue. There may be degenerative lesions of the kidney of so slight a character that they do not cause either exudation from the vessels or proliferation of the connective tissue, but interstitial changes are always accompanied and preceded by lesions of the parenchyma. For him the whole process which was regarded as Bright's disease was a diffuse nephritis, in which he distinguished different forms.

The views of Weigert have been accepted by most of the German clinicians. It is the general habit now to speak of these diffuse renal lesions as Bright's disease, the term being used with more or less ambiguity. The term "nephritis" is also applied to the process.

For the present the classification of the diffuse lesions of the kidney

must be founded on the character of the anatomical lesions. A classification on an etiological basis is the most scientific and the simplest, but we know little or nothing of the etiology of these diseases. Various forms of disease in other organs, particularly of the heart, are often found associated with them. Bacteriological investigation has shown in many cases the presence of certain organisms in the kidney. In most cases the bacteria are found in some other lesions and in the blood, and their presence in the kidney is but a part of a general septicæmia. Moreover, the same condition in the kidney may be associated with a variety of organisms, and the same organism may be associated with widely different anatomical lesions. Nor is there anything in these lesions to show that they are produced by the direct action of bacteria on the tissues. From the diffuseness of the lesions, from their affecting all parts of the kidney, it would seem evident that they must be due to injurious substances in solution in the blood. We know that chemical substances are produced by bacteria, and that their presence in the blood can produce various lesions, mainly degenerative in character, in the kidneys. Morse has shown that the continued injection of the sterile filtrate of virulent cultures of the staphylococcus aureus into the blood will produce not only degeneration of the epithelium, but hyperplasia of the interstitial tissue. Although it is probable that the chemical substances produced by the bacteria may play an important *rôle* in the production of renal disease, their importance may be overestimated. Even when we find renal disease associated with bacterial infection localized elsewhere the relation between the two may be the other way. The renal disease may be the primary condition, and the bacterial infection may be due to some alteration in the character of the blood which renders the tissues more prone to infection. Substances may be produced in the alimentary canal, or by the imperfect action of some one or other organ, which may exert an injurious action on the kidneys. When we speak of these lesions as diffuse, we do not mean that all parts of the kidney are equally affected. The study of the degenerations which occur in the course of infectious diseases and from the action of poisons has shown that in some cases the convoluted tubules are the most affected; in others the collecting tubules or the loops of Henle. All parts of the kidney are, of course, equally exposed to the injurious action of chemical substances, but all may not be equally susceptible. With slight differences in the intensity of the lesions, due to conditions which we do not understand and which may represent an increase or diminution of the local resistance, susceptible tissues will be affected. In the same way, in the more severe lesions of the kidney we find that in some the glomeruli are principally affected; and although these lesions in the glomeruli may be accompanied by lesions chiefly degenerative in the tubular epithelium, these may be, in part or wholly, secondary to

the lesions in the glomeruli. In other cases, again, there are lesions in the connective tissue consisting in active proliferation of the cells contained in this. This acute hyperplasia of the connective tissue, although accompanied by degenerative changes of the epithelium, cannot be considered as primary to such changes. No anatomical classification can be so sharp and definite as one based on etiology. In the anatomical classification there often occur mixed forms. One form may have another grafted on itself, and an acute glomerular affection may be added to a chronic arteriosclerotic change, or to a hydronephrosis. The anatomical classification must be based on the character of the lesions as determined by the histological examination. Although the microscopic lesions are accompanied by more or less definite alteration in the gross appearance of the kidney, yet the connection is not sufficiently definite to enable us to determine by these gross appearances the one form of lesion from the other. From my study of these diffuse lesions of the kidney it has seemed to me that the following classification might be adopted. I include here both the acute and chronic, although this paper has reference only to the more acute lesions. It must be understood that in using the word nephritis we do not necessarily imply that the lesions fall under the rubric of inflammation, but the word is used as signifying simply disease of the kidney. It might possibly be well to substitute for the word nephritis the term "nephropathy," although the objection to this is a complication of an already complicated nomenclature.

I have adopted the following as perhaps the most suitable classification of diffuse nephritis which we can make from an anatomical basis:

Acute Diffuse Nephritis. (*a*) *Acute degenerative nephritis.* In this are included degenerative lesions of the epithelium, embracing cloudy swelling, hyaline, fatty, and dropsical degeneration, and often complete necrosis, without lesions other than degenerative, in the glomeruli or in the interstitial tissue. This occurs chiefly in infectious diseases, in jaundice, in anæmia, and as the result of the action of certain poisons. The kidney is slightly swollen or unchanged in size, rather paler and more opaque on section; the markings may be obscure or more prominent than normal. There is often albuminous exudation in the glomerular capsules and in the tubules.

(*b*) *Acute glomerular nephritis.* The essential changes consist in acute lesions in the glomeruli. There may be acute proliferation of the endothelium of the vascular tufts, hyaline and fibrinous thrombi in the vessels, accumulation of leucocytes in the vessels, degeneration of the vessel-wall, etc. These changes in the vascular tufts of the glomerulus can take place with or without changes in the capsular epithelium. The changes in the capsular epithelium consist in degeneration and proliferation. The capsular space may contain an albuminous hemorrhagic or

fibrinous exudation. The changes in the vascular tufts and in the capsule are so frequently combined in various degrees that they cannot be separated into two sub-classes. The glomerular lesions are accompanied by degeneration of the tubular epithelium, necrosis, and exfoliation. Often there are dilatation of the tubules and œdema and cellular proliferation of the intertubular tissue. There may be more or less hemorrhage in the tubules.

This affection occurs in infectious diseases, notably in acute endocarditis, measles, and diphtheria, or as an independent affection. The kidney is usually increased in size. The capsule easily strips off; the surface is pinkish and mottled with points of ecchymosis. On section the cortex is wide, rather paler and more opaque, markings obscure; glomeruli pale, enlarged, and prominent. Pyramids often congested. The tissue moist and pits on pressure. While these appearances are usually marked, lesions of the glomeruli may be found with but little macroscopic change in the kidney.

(*c*) *Acute hemorrhagic nephritis.* The essential change consists in hemorrhage in the tissue combined with degeneration of the epithelium. The hemorrhage is chiefly found in the capsule of the glomeruli and in the tubules. The degenerative lesions may be extensive and lead to necrosis and exfoliation. Œdema, hemorrhage, and cellular infiltration are often found in the intertubular tissue. The kidney is enlarged, hemorrhages are found in the capsule; the surface is dark red, with numerous ecchymoses. On section the cortex is swollen and sprinkled with dots and streaks of ecchymosis. Only three cases of this were found in my series.

(*d*) *Acute interstitial non-suppurative nephritis.* The essential lesion consists in acute proliferation of the cells in the intertubular tissue. The proliferation takes place mainly from the vascular endothelium. The cells lie within and without the vessels. They are large and similar to the endothelial cells of young granulation-tissue. They are found chiefly in the intermediate zone of the kidney between the pyramids and the cortex. In the cortex they are both generally diffused and in areas chiefly around the glomeruli. There is more or less degeneration and necrosis of the tubules, affecting chiefly those in the areas of cellular infiltration. Leucocytes in small numbers may be found in the intertubular tissue among the other cells, in the degenerated epithelium, and in the lumen of the tubules. The glomeruli are not affected. This affection occurs in acute infectious diseases, notably in diphtheria and scarlet fever. The kidney is large, pale, somewhat mottled; on section moist, opaque, markings obscure, and milky fluid can be pressed from it.

Subacute Glomerular Nephritis. The essential lesions are in the glomeruli. They consist in swelling and nuclear increase in the vascular tufts and obliteration of the vessels by hyaline degeneration, both of the cells and the vascular walls. These changes in the tufts are

often combined with proliferation and desquamation of the capsular epithelium with connective-tissue ingrowth. There are extensive degeneration, necrosis, and desquamation of the tubular epithelium. The intertubular tissue is the seat of œdema and connective-tissue formation. There is often a previous history of exposure to cold or of an infectious disease, and it may occur after rheumatism or endocarditis. The kidney is enlarged, the capsule may cling slightly to the surface; the surface is pale or slightly mottled. On section cortex increased in width, pale, opaque, markings obscure, glomeruli pale, consistency increased. There are gradual transitions between this and the acute and chronic glomerular nephritis.

Chronic Diffuse Nephritis. (*a*) *Chronic glomerular nephritis.* The essential lesions are in the glomeruli. They consist in extensive hyaline degeneration of tufts and of entire glomeruli, and obliteration of capillaries. Every transition may be seen between these glomerular lesions and those in the subacute form. There may be some increase in the capsular epithelium and connective-tissue formation within the capsule. The tubular epithelium shows extensive degeneration and destruction. Entire tubules are destroyed, often being represented by the thickened irregular membrana propria. There is a general and diffuse increase of the connective tissue affecting almost equally all parts of the kidney. This condition is usually found as an independent affection or may be combined with acute infections of various sorts. There is often a history which points to a previous acute or subacute affection. The kidney may be slightly larger than normal, of normal size, or considerably smaller. The capsule is often adherent, the surface even, not granular, pale. On section the cortex varies in width; it may be quite small. It is opaque, whitish, the markings obscure; the glomeruli not visible or pale, and the consistency of the tissue is greatly increased.

(*b*) *Chronic arteriosclerotic nephritis.* The essential lesions are in the arteries and consist in those changes which are known as arteriosclerosis. There is degeneration of the epithelium of the tubules with more or less complete destruction. The degeneration takes place slowly, and at any given time sections may show only a slight degree. Atrophic changes in the epithelium are common. The lesions may affect almost equally all parts of the kidney, or appear in areas corresponding to the distribution of those arteries which are most affected. There is a general increase in the connective tissue, though large areas of tubules may be found with no increased tissue between them. The lesions are never so diffuse as in the glomerular form. This condition of the kidney is found accompanying a general arteriosclerosis affecting all the arteries of the body, or the lesions may be most marked in the renal arteries. The kidney varies in size; it may be slightly larger, or of normal size, but it is usually very much smaller. The capsule may or may not be adherent.

The surface is more or less irregular and granular. The color red, often cyanotic. On section the cortex may be much diminished in size, of a dark-red color, the markings obscure, the glomeruli injected; the arteries in the intermediate portion are evident and often project above the cut surface. The pyramids show venous congestion. The consistency of the kidney is greatly increased. The lesions are due to a combination of causes: to the diminution in the blood-supply, to the impairment of the function of the vessels by the destruction of the muscular coat, and to the accompanying venous congestion. Most of the cases of contracted kidney belong to this class.

(*c*) *Chronic degenerative and interstitial nephritis.* To this class belong those cases of contracted granular kidney which occur without primary arterial lesions. It is difficult to give a name to the condition, for there is no single change which predominates. Degeneration, atrophy, and destruction of the epithelium in various places are found. There is a general increase in the connective tissue more diffuse than in the arteriosclerotic nephritis, but not so diffuse as in the chronic glomerular form. The increase in the connective tissue is most intense where the degeneration of the epithelium is most marked. Lines of connective tissue extend to the surface, and by their contraction produce depressions. Very minor degrees of change, which may consist in small areas of cellular infiltration, with hyperplasia of the connective tissue extending down from the capsule, are very commonly found. The essential lesion seems to be a slow degeneration of the epithelium, followed by connective-tissue hyperplasia. The macroscopic appearances of the kidney vary extremely, following the different degrees of the lesion. The gross and microscopic conditions may be complicated by lesions of another character.

Senile Nephritis. In the senile kidney the chief lesions are those due to disease of the vessels. These vascular lesions are accompanied by impairment in the power of regeneration. Previous lesions of the kidney, even though slight in character, may gradually make their influence felt in impairing the resistance of the tissue. The epithelial lesions may consist chiefly in atrophy. Microscopically the kidney is usually more or less injected and atrophied. On microscopic examination the epithelium of the tubules is degenerated, small, and atrophic. The formation of yellow pigment in the atrophic epithelium is frequently seen. There is some general increase in the connective tissue, but this is chiefly marked close beneath the capsule, and may extend from here in lines into the cortex.

Amyloid Nephritis. In the amyloid nephritis, as the name implies, the characteristic lesion is the amyloid infiltration of the blood-vessels. This may occur alone and may produce certain lesions of the tissue, or it may accompany any of the other forms of nephritis. When

amyloid infiltration affects the glomeruli alone lesions closely resembling those in other forms of glomerular nephritis may be produced.

In this paper I shall give the results of the study of fifty-two cases of nephritis. They embrace acute, subacute, and chronic glomerulo-nephritis, acute interstitial and acute hemorrhagic nephritis. The larger part of these kidneys come from autopsies made at the Boston City Hospital, in which the bacteriological cultures of all organs were made. A part were brought to the pathological department of the Harvard Medical School for diagnosis, only the kidneys being examined; and in part they consist of old specimens in which little or nothing was known of the accompanying disease and no bacteriological examination made. The clinical histories of most of these cases are unsatisfactory. Many of them have gone into the hospital in a moribund condition, and nothing could be learned concerning them. In others little attention was paid to the examination of the urine, as attention clinically was not prominently directed to the condition of the kidneys.

The methods used for histological examination consisted in making frozen sections, in hardening the tissues in various ways, and examining sections of the hardened tissues after imbedding in celloidin and paraffin. All the modern methods of staining were used. A great deal of importance should be attached to the study of frozen sections, because only in this way can the extent of the degenerative lesions of the epithelium be fully recognized. This method was found far more satisfactory for this purpose than by the use of osmic acid.

Acute Glomerulo-nephritis. The glomerular lesions in diseases of the kidney were recognized by the early investigators, but it is only of late that the important part which they play has been appreciated. Virchow described the increase in the number of cells in the glomerulus, and gives a figure illustrating the condition. Förster has described the increase in cells in the capillaries, thickening of the capillary wall, and proliferation and desquamation of the epithelial cells of the capsule. Klebs was the first to study these changes of the glomerulus more closely. He describes in the kidney of scarlet fever slow proliferation and degeneration of the capsular epithelium. He also describes an increase of the cells in the glomerulus, which he thinks comes from a proliferation of the cells of the connective tissue between the vessels. Langhans, in two publications in Virchow's *Archiv*, describes the lesions in the capillaries. He thinks that these lesions consist in proliferation of the capillary endothelium, leading to the accumulation of cells within the capillaries, and the formation of a protoplasmic network which completely occludes the vessels. Hausemann describes the cells in the glomerulus as lying between the capillaries and due to proliferation of the connective tissue.

Ribbert speaks of the importance of glomerular lesions in all cases of

nephritis. He found them not only in acute scarlatinal nephritis, but in subacute and chronic cases. Welch describes the glomerular lesions observed in the human kidney as well as those produced experimentally in white rats by the injection of cantharidin. He proposes the term desquamative glomerulitis to describe those cases characterized by proliferation of the capsular epithelium with accumulation of cells in the capsules, and the intracapillary glomerulitis to describe those cases in which accumulation of cells inside of the capillaries is the chief lesion.

I have observed twenty-eight cases in which lesions of various degrees of acuteness were found in the glomeruli, and in which, although lesions in other parts of the kidney were found, the glomerular lesions from their intensity appeared to be primary. In placing them among the acute cases the character of the lesions, and not the clinical history, has been considered. In those cases in which a clinical history referable to the kidneys has been obtained the lesions which have been considered anatomically as acute have agreed with the clinical history. In determining the acuteness of the process from an anatomical point of view the abundance of cells and the slight character or absence of connective-tissue increase have been mainly considered. Although these glomerular lesions vary, the pathological processes found in the glomeruli are too often combined to warrant us arranging them into different classes.

I shall take up separately the different processes found in the glomeruli. Proliferation of the cells in and among vessels of the glomeruli was observed in all but two cases. In a number this was the only change observed. On microscopic examination with low power the glomeruli are prominent from their increased size and the abundance of cells. They fill completely the capsular space and the capillary loops adjacent to the tubule, which causes the glomerulus often to project a considerable distance into the tubule. On section these masses projecting into the tubules may be cut across, appearing then as portions of capillaries lying within the tubules. Serial sections and sections cutting the glomerulus in other directions will show that they are always connected with the mass of capillaries. In most of these glomeruli there is no appearance of division of the capillaries into separate masses. In those cases regarded as most acute the capillary walls could be clearly distinguished. The walls of the capillaries are thickened and refractive. The cells in some cases can be seen to lie within the capillaries, but this is only the case in cross-sections of the vessels and in very favorable longitudinal sections. The vessels are so small, and their course so tortuous, that only by the most exact focussing can we distinguish those lying in the vessels from those outside. The special cells in the vessels are not leucocytes. In many cases leucocytes are found among them, and in some cases they are very abundant. The polynuclear leucocytes can always be distinguished from the other cells within the capillaries by

the form and characteristic stain of the nucleus. The other cells also differ from lymphoid cells. The nuclei are granular, and they stain brightly, but not so brightly as the nuclei of leucocytes. In some cases the protoplasm of the single cells is difficult to make out, and masses of protoplasm appear to be joined together, forming an irregular protoplasmic network within the capillary similar to that described by Langhans. The cells can be distinguished from the nuclei of the epithelium by their oval shape and the more vesicular character of the epithelial nuclei. In some cases very large cells were abundant, and granular protoplasmic masses were found within the capillaries. Many of these intracapillary cells are similar to those found in acute interstitial nephritis, which can be clearly shown to lie within the vessels, and to be probably derived from proliferation of the endothelium. In all of these cases the absence of red blood-corpuscles in the capillaries of the glomeruli is conspicuous.

In specimens hardened in Flemming's solution extensive fatty degeneration was often found in these cells, both those without and those inside the capillaries. In the specimens which were hardened in corrosive sublimate, or in fluids into whose composition this entered, the red corpuscles were stained vividly, and in some cases none, in others very few were found within the vessels. With the increase of cells within the vessels there was found associated a thickening of the wall which seemed to take place on the inside. The edge toward the lumen becomes irregular, and in some cases the lumen is almost entirely obliterated. These thickened vessels give a distinct hyaline stain, and seem to represent the beginning of the more marked degeneration of the glomerulus described in the subacute and chronic forms.

In addition to the cells a more or less irregular, somewhat granular material was found in the capillaries. It sometimes forms a reticulum among the cells, or by itself. This material did not stain as fibrin, and may have been composed of the remains of degenerated and necrotic cells. In some cases small hyaline masses were found in this reticulum.

The extent to which the leucocytes take part is interesting in view of the fact that some observers have considered most of the cells within the glomerulus to be leucocytes. In but one case were they found in the glomerular vessels in any abundance. Some of the capillaries in this case were filled with them, and they were found in considerable numbers in the glomerular spaces and in the tubules. This is interesting in view of the fact that emigration of leucocytes through the glomerular vessels has been denied. In some sections in this case they were seen in the act of emigration, part of the cells being within and part without the vessels, and both those in the glomerular capillary and those in the tubules were most probably due to emigration from the glomerular vessels. In those cases in which necrosis of groups of vessels was seen

leucocytes and nuclear detritus were found in the necrotic tissue. Hyaline thrombi were found in the vessels in three cases. In one of these all of the capillaries and some of the glomeruli were occluded; the thrombi were perfectly homogeneous, highly refractive, and gave the characteristic fibrin-reaction with Weigert's fibrin-stain. Ribert describes such hyaline thrombi in the kidneys of rabbits after staphylococcus infection, and they have been found in a variety of other acute infections. They appear to be more common in animals than in man. In one case they were found in a child with staphylococcus septicæmia, and in the other two cases no cultures were made. Fibrin within the vessels and the capillary spaces, and in the tubules, was found, both associated with hyaline thrombi in the glomeruli and without them. In one case so much fibrin was present that it must have played an important part in the formation of casts. Necrosis of glomeruli affecting small masses of capillaries was found well marked in two cases, and a slight degree was seen in some of the other cases. In the necrotic portion the details of the tissue could not be made out. The whole tissue was converted into an indefinite granular mass in which Weigert's stain showed some filaments of fibrin. Leucocytes and nuclear detritus were found in it. This definite necrosis of the tissue of the glomerulus differs from the formation of hyaline. The hyaline tissue appears both as hyaline thickening of the capillary walls and as the formation of hyaline drops in the protoplasm of the cells within the capillaries. Proliferation of the capsular epithelium plays a prominent part in the glomerular changes. In some cases this was so marked that on superficial examination the other lesions could have been overlooked. Although more marked in some cases than in others, it is impossible to divide the cases according to this lesion. It was especially evident in two cases, but was present to some extent in nearly all. Even in the most typical of the intracapillary cases among the cells there were some which, from their large size and the vesicular character of the nuclei, must have been derived from the epithelium. The proliferating capsular epithelial cells formed crescentic-shaped masses between the glomerular tuft and the capsule. The cells were usually flattened by pressure and the nuclei deformed. In some the nuclei had lost their power of staining, and the cells were converted into a more or less granular, apparently necrotic mass. Hypertrophied capsular cells connected with the capillaries by a long footstalk were occasionally found. Nuclear figures in small numbers were found in the capsular epithelium. Dilatation of the tubules was often observed, and it is difficult to explain. It is possible that it may have been due in part to pressure exerted on the tubules in some parts of their course by the œdematous intertubular tissue. In part it may be explained by a blocking up of the tubules by casts and epithelial detritus. Fatty degeneration of the epithelium was found to

some degree in almost all cases, but was in none excessive. The extreme degree of fatty degeneration which is found in phosphorus-poisoning, jaundice, and sometimes in acute pneumonia, was never present. The fatty degeneration was generally diffuse, and the fat was in small granules. Granular and hyaline degeneration of the epithelium was found both with and without the fatty degeneration. In the hyaline degeneration single cells were found enlarged and filled with large and small hyaline drops. Sections of single tubules were found filled with hyaline material. The nuclei of such cells were in some cases fairly well preserved, in others they either did not stain or were small and solidly stained. Single hyaline degenerated cells or masses of hyaline cells partly preserving the globular form, and partly moulded into hyaline cylinders, were often found in the tubules, evidently the result of desquamation of the epithelium higher up. In some of the dilated tubules the epithelium was simply atrophic. Necrosis affecting single cells and groups of cells was frequently seen. The single necrotic cells could be distinguished from the others by the homogeneous staining of the protoplasm and the changes of the nucleus. In some cases the epithelium was enormously swollen, very clear, and filled with small spaces. A very common condition found in the tubules was the presence of masses of small circles which filled up the entire tubule, the edges of the circles forming a fine reticulum. Granules were often present in the edges of the circles, both within and around them. With fuchsin the circles and granules often stained as brightly as do the nuclei. A reticulum of this character may be seen in the simple degenerative lesions of the kidney; it was often found in the capsule of the glomerulus. In one case it was very prominent, almost every tubule being filled with it. I do not know the source and the nature of this peculiar material, which may be met with in other places. I have never seen any appearances which make me believe that it can be a substance secreted by the cells. The swollen ends of the cells may be so cut by the microtome knife that they appear as circles in the tubule; but it is obvious that such an explanation will not suffice. An albuminous secretion coagulated by the hardening-agents does not take such a form, but is represented by a granular or homogeneous mass, this depending on the hardening-agent. The most marked change in the interstitial tissue of the kidney is œdema, and the increased size of the kidneys, in one case reaching 880 grammes, is generally due to this. The space between the tubules may be very wide, and is filled with a thin, sparse reticulum, in the midst of which run the vessels. The œdematous condition of the kidney is also evident macroscopically. The tissue is more succulent than normal, and in some cases pits on pressure. In the acute cases there is no actual increase in the connective-tissue fibrillæ. In those cases in which the lesions of the glomeruli approached the subacute form, as is shown by the begin-

ning lobulation and hyaline degeneration of groups of vessels of glomeruli, the interstitial tissue is denser and contains more cells. The cellular increase takes several forms. In the intermediate zone there is found small cell-infiltration around the larger vessels, particularly around the veins. These cells are small and similar in character to the lymphoid cells of lymphatic tissue and the blood.

As we have said, in the normal kidney small collections of such cells, probably representing small areas of lymphatic tissue, are often found around these vessels, and the increased number of cells may represent hyperplasia of this tissue. In other cases the cells have a different character. They are large; the nuclei stain brightly and contain considerable chromatin and reticulum. The protoplasm is finely granular and stains more intensely than the protoplasm of the epithelial cells. These cells are frequently found within the vessels, and many of them certainly come from proliferation of the endothelium. In several cases these cells were present in variable numbers, and in one case they were so numerous as almost to warrant us in regarding this case as a mixed form of glomerular and interstitial nephritis. In one case the connective tissue in the vessels showed the lesions of arteriosclerotic nephritis, and superadded to this there were acute lesions of the glomeruli.

In all cases the kidneys were enlarged. In adults the weights varied from 400 to 880 grammes; average weight 517 grammes. Orth gives the normal weight of adult kidneys in man as 320 grammes, and in women as 293 grammes, which is slightly under the average I have found. The weights were taken after removal of the capsule and adherent tissue of the pelvis. The capsule is usually hyperæmic; it strips off easily, even parting itself from the swollen kidney after section. The surface is smooth, or it may be irregular from accompanying infarctions or previous disease. The color varies, being usually of a light pinkish tinge, and mottled from varying degrees of congestion. There are usually small whitish foci varying in size, marking areas of more intense fatty degeneration and small points of ecchymosis. On section the tissue is distinctly moister than normal. A thin, opaque fluid is easily squeezed from it, and it pits on pressure. The cortex is increased in size, and the markings are obscure. On section of the cortex the small opacities and ecchymoses may be observed as on the surface. The glomeruli are pale and bloodless. In most cases they are easily visible and stand out from the cut surface, appearing as grains of fine sand sprinkled over it, and are rather more refractive than normally. The pyramids are usually enlarged, but relatively much less than the cortex, and may be hyperæmic.

The presence of bacteria in the kidneys or in the accompanying acute lesions was noted in eighteen cases. Their presence was determined by cultures, by microscopic examination of cover-slips and in sections. In

some cases inoculations of animals with pure cultures of the bacteria found were made. No anaërobic cultures were made. Little or no attention was paid to the colon bacilli, and in only one case in which they were found alone is their presence mentioned. In the routine cultures made at autopsy they are found so commonly and in such different conditions with and without lesions, and accompanying bacteria which may be regarded as the cause of the lesion, that we are disposed to consider them as having no specific and probably no pathogenic properties. They probably enter the tissues from the alimentary canal immediately after death or under conditions when the resistance of the tissues to their growth is diminished. There has been a notable diminution in the finding of colon bacilli at autopsies since the use of the refrigerator system, by which the bodies are kept at a temperature of 32° in the Morgue of the Boston City Hospital. Usually the bacteria found in the lesions in the kidneys were simply part of a general septicæmia. The organism most commonly found was the pneumococcus. This was found in eleven cases; in three streptococci were found; in one staphylococci; colon bacilli in one without any accompanying organism, and in two the cultures were sterile. Of the sterile cases, the kidney-lesions in one followed acute articular rheumatism, and in the other there were no lesions elsewhere. There was some general agreement between the character of the lesions and the sort of bacteria present. The most typical cases of the intracapillary glomerular lesions accompanied infection by the pneumococcus. In the streptococcus infections leucocytes entered more prominently into the process, and there was more of the acute interstitial change. In the single staphylococcus infection the hyaline thrombi in the glomeruli were the most prominent accompanying acute lesions. Endocarditis was present in ten cases. Nine of these were due to pneumococci, and one to streptococci. The endocarditis was acute and usually of the ulcerative form. In most cases the lesion was primary, and in a few only represented an acute form engrafted on an old lesion. There is a well-marked relation between pneumococcus endocarditis and that form of glomerulo-nephritis in which the intracapillary lesions are most prominent. In one case of general peritonitis, due to pneumococcus, from an autopsy of Dr. Wright's at the Massachusetts General Hospital, the kidney lesions were of the same type as those in acute pneumococcus endocarditis. In my earlier investigations so many cases of acute endocarditis were found with intracapillary lesions that I was disposed to consider pneumococcus endocarditis as the single associated condition. The pneumococcus has been present in the form of a general septicæmia in practically all cases in which the acute renal lesions were found.

In the Boston City Hospital acute croupous pneumonia, due to the pneumococcus, forms a large portion of the autopsy material. On recently reviewing the cultures made in acute croupous pneumonia we

have found that out of 110 cases 107 gave pneumococci on culture. Glomerulo-nephritis has been found to accompany the pneumonia in but one case, and in this, both from the character of the lesions in the kidney and from the clinical history, it was evident that the kidney lesion was primary. Interlobular pneumonia, with abscess due to staphylococci, was found in one case. It is very remarkable that the pneumococcus endocarditis should be so frequently accompanied by nephritis, and the acute croupous pneumonia, due to the same organism, so rarely. Erysipelas, with streptococcus infection, was found in one case; measles in two; syphilis, with the constantly accompanying streptococcus infection, in two, one of which was combined with measles. Acute articular rheumatism was found in one case; acute streptococcus infection following abortion in one; scarlet fever in one; diphtheria in one; gonorrhœa in one, and in one acute pneumococcus peritonitis. The presence or absence of œdema was noted in fourteen cases. Of these it was present in ten cases. In seven of these cases there was acute endocarditis, with extensive valvular lesions, in one erysipelas, and in one acute articular rheumatism.

Subacute and Chronic Glomerulo-nephritis. I have included with the acute cases the cases of subacute and chronic glomerulo-nephritis because their consideration obviously follows in this place, and every gradation from the acute to the subacute and chronic can be followed.

This condition of the kidney has been known under various names. It is the large white kidney of Wilke and the chronic parenchymatous nephritis of modern writers. There is no doubt that the amyloid kidney was and still is frequently confounded with it, and without staining for amyloid they often cannot be distinguished. In the amyloid kidney there is the same degeneration of the epithelium, due most probably to the same cause. Disease of the glomerulus interferes with the circulation within it. In the amyloid kidney the vessels of the glomeruli are occluded by amyloid material deposited in the walls of the vessels and between them. In the chronic glomerulo-nephritis the occlusion is brought about by hyaline degeneration. In both the duration of the process varies, and in both there may be extensive destruction of the parenchyma, followed by a general increase in the connective tissue. It is convenient to separate them by the presence of amyloid in one; but apart from the amyloid the process is very similar, although the deposit of amyloid in the glomerulus is not preceded or accompanied by cellular proliferation. In a review of the lesions of these cases the glomeruli claim our chief attention. Much that we have stated of the condition of the glomeruli in the acute glomerulo-nephritis is clearly applicable here. Slight differences in the degree of involvement may be found in different glomeruli and in different parts of the same glomerulus. All of them show an increase in the number of cells. In places

conditions resembling the acute forms are seen, the cells being greatly increased in number, and lying for the most part within the capillaries. A condition of lobulation of the glomerulus is one of the most prominent lesions. Even in the acute form a division of the glomerulus into more or less definite lobules is often seen. In the more marked form the glomerulus appears to be divided into a number of definite lobules, the separation between them extending down to the root. Cross-sections of the glomerulus and root usually show four to six such lobules. In sections passing through the glomerulus in the other direction as many as eight distinct and separate masses can be found; with the lobulation the hyaline degeneration of the glomerulus advances. The hyaline degeneration appears first in the outlying capillary loops, those most distant from the root. At first only small portions become hyaline, and by gradual extension whole lobules and even whole glomeruli are so altered. The hyaline material is homogeneous, it stains brightly with eosin and with acid-fuchsin, and in alcoholic specimens saffranin gives it a faint bluish or lilac hue. The hyaline appears to be formed in two ways, finally becoming united into a single mass. The membrana propria of the capillary wall becomes swollen, and takes on a hyaline stain. Cells lying within and between the capillaries show hyaline droplets in their interior just as do the cells of the tubules, and the hyaline material so formed may become fused together with the production of irregular hyaline masses in which remains of nuclei and particles of chromatin may be occasionally found. Such hyaline material, unlike the hyaline thrombi, does not take the fibrin-stain. In the hyaline masses small spaces, with here and there red corpuscles or leucocytes, mark the vessels. Dilated vessels filled with red blood-corpuscles are occasionally found. At first there seems to be no increase in the number of nuclei. They are crowded together in a hyaline mass and show various differences in form and staining. Most of them are irregular and elongated, and stain homogeneously. The protoplasm of the cells belonging to them is merged into the hyaline mass. Very thin sections in places where the hyaline formation is not advanced enable us to gain some idea of its mode of formation. Occasionally capillaries are found cut longitudinally in which the lumen is exceedingly small and irregular, and the wall thickened apparently by the formation of hyaline on the inner wall of the vessel. Nuclear detritus is found to some extent in the hyaline material. All the cases in which fresh examinations were made, or in which portions of the tissue were hardened in Flemming's solution, showed a considerable fatty degeneration of the cells of the glomeruli. The capsular epithelium in most cases shows some hyperplasia. Flattened epithelial cells derived from the capsule are found in the capsular spaces and between the lobules of the glomerulus. In some cases the growth is excessive, and sections passing at right-angles to the root of

the glomerulus showed the single groups of hyaline vessels completely surrounded by epithelial masses derived from the capsular epithelium. The nuclei in the epithelial cells are frequently irregular in form and atrophic, and the cells converted into a more or less granular mass. Various degrees of connective-tissue formation take part in the capsular change. Bands of connective tissue extend from the capsule into the epithelial masses, more or less dividing them, and connective-tissue fibres are shown by the Van Giesan stain among the cells. There is no evidence of connective-tissue formation from the capsular cells, but in all instances it seems to have gone into the masses from the connective tissue of the capsule. The connective tissue of the capsule is found thickened and the cells in it increased in number. The hyaline masses of the glomerulus are often found adherent to the capsule, and in one specimen there was a long, projecting mass of connective tissue which extended from the capsule down to the root of the glomerulus, and which contained several wide vessels. The epithelium of the tubules showed extensive degeneration which did not differ materially in kind from that described in the acute forms. The tubules are found dilated and filled with desquamated cells, hyaline material, and glomerular débris. In one case the epithelium of the dilated convoluted tubules was atrophic and the cells crescentic in form. The tubules in this case contained great numbers of these crescentic-shaped cells, which seem in part to be due to desquamation in the tubules; in part to come from the glomerular capsules in which there is extensive hyperplasia. Hyaline degeneration of the epithelium was found in every case. There is a varying degree of involvement of the connective tissue of the kidney. It is always slightly increased, and in the more chronic cases there is a general growth extending diffusely throughout the tissue. The diffuseness of this connective-tissue formation explains the absence of granular contraction of the surface, even though the kidney, as a whole, may be atrophied. That the subacute and chronic glomerulo-nephritis represents a more marked condition of lesions of the same general character as those found in the acute form is evident. In both the glomerular changes are the most striking lesions. Changes similar to the acute, consisting in the increase of cells in the capillaries and hyperplasia of the capsular epithelium, are found in the chronic. In the chronic there is a greater degree of hyaline degeneration, partly from conversion of the cells into hyaline, partly from hyaline degeneration of the walls of the vessels, followed by contraction, by which the lobulation becomes pronounced. The degree of the connective-tissue formation seems proportionate to the degree of epithelial degeneration and desquamation, and probably follows it. Macroscopic appearances of these kidneys vary greatly; they were usually of somewhat increased weight. The lowest weight found in the six cases at the Boston City Hospital was 300 grammes, and the highest 425 grammes.

Of the two cases in which the lowest weights were found, one was a boy of twelve years, and the other a girl of sixteen years. The average weight of the six cases was 395 grammes. The macroscopic appearance of the kidneys also varies. The capsule strips off easily. The cortex of the kidney is smooth, rather paler than normal, and the surface is marked with small, white, opaque spots, and by small foci of ecchymosis. On section the markings of the cortex are obscure, the consistency of the kidney is increased. The glomeruli may be seen on the cut surface as small, pale, projecting points. No complete history of the duration of the disease could be obtained. The longest history was that of six months, and the shortest two months. An accompanying acute rheumatism was found in two cases; two attributed the disease to having taken cold, and in one case there was an acute endocarditis engrafted on an old lesion. Nothing of any importance was learned from the bacteriological examination.

Acute Interstitial Nephritis. This form of nephritis was first described by Wagner under the name of lymphomatous nephritis, and he makes it one of the four forms of Bright's disease. He says it is most frequently found in scarlet fever, but may be found in typhoid. The kidneys are large and pale. Hemorrhage may be present in slight degree or entirely absent. The most characteristic lesion is an accumulation of round cells of various sizes, which are most numerous around the glomeruli. Others have described these lesions in the interstitial tissue, but they have not been regarded as sufficiently marked to constitute an anatomical type of nephritis.

Orth has an interesting description of the process in his text-book of *Pathology*. He says he has seen kidneys in which there were none or very very slight lesions of the epithelium and glomeruli, but in which there was a small cell-infiltration in the interstitial tissue. He describes such kidneys as large and pale. Regarding the origin of the cells, he says they have a large, round, vesicular nucleus, and differ from the ordinary emigrating leucocytes. He thinks they may be derived from proliferation of the tissue-cells, although their position around the veins would show that emigration also plays a part in their production.

There is a liability to confusion in giving the name acute interstitial nephritis to this process because this name is frequently used to describe purulent nephritis. The lesions in the interstitial tissue are so marked that no other name is fitted to describe them. The essential lesions are in the interstitial tissue, and are so prominent and accompanied by so little change in the parenchyma that they cannot be regarded as secondary to parenchymatous lesions. While there is no doubt that lesions of the parenchyma of a tissue, when they are sufficiently extensive and when long enough time elapses, will be followed by a growth of interstitial tissue which has the effect of making good the loss, there is equally

no doubt that there can be primary lesions of the interstitial tissue. The cells in this case are in a way similar to those seen in acute hyperplasia of the connective-tissue cells, particularly those of the walls of the bloodvessels occurring under other conditions. Similar cells to these may be found in rapid proliferation of subcutaneous tissue in the vicinity of wounds, and it is probable that they have the same origin. The cells seem in large part to come from the endothelium of the bloodvessels, the small veins, and capillaries. So far as I have been able to see, the arterial endothelium takes no part in the process. The cells are found in the greatest numbers in the lower portion of the cortex, which we have designated as the intermediate zone, though by no means confined to this. There are both a general and a focal increase in the cells. The focal increase is found chiefly around the glomeruli, extending from these into the surrounding intertubular tissue. The cells of the connective-tissue capsule of the glomeruli and the capsule around this take part in the process. Among these cells leucocytes are present in variable numbers, and the process is probably accompanied by emigration. The leucocytes are found both in the interstitial tissue, between the cells, and in the degenerative and necrotic epithelium of the tubules in their midst, and in the lumens of these tubules. None of the large cells are ever found within the tubules. In all of the cases there is more or less degeneration of the epithelium, which is more marked where the interstitial cellular infiltration is most prominent. Elsewhere throughout the kidney the degeneration, though present, is not so marked. In those cases in which fresh examinations were made fatty degeneration was found. In none of the cases were the glomeruli affected. The degeneration of the tubular epithelium in the interstitial infiltration may be partly due to pressure exerted by the masses of cells. It is probable that in this case we must assume the presence of a toxic material which exerts its action on the constituents of the kidney tissue, and which at the same time leads to a degeneration of the parenchyma and proliferation of the interstitial tissue. The macroscopic appearance of the kidneys is characteristic. They are enlarged; the capsule is often so tightly stretched that on section it bursts from the tissue of the kidney. The increase in size of the kidneys is in the cortex. Beneath the capsule the kidneys are pale, more opaque than normal, and with areas of hyperæmia and few ecchymoses. On section they often present the appearance of abscess-formation. Just above the pyramids extending in lines up into the cortex there are opaque masses appearing as abscesses from which a purulent-looking fluid can be squeezed. The markings of the cortex are completely obscured; the glomeruli are not visible.

In the nine cases of this which I have seen, in one the age could not be ascertained; one was from a woman aged thirty years, and the others were from children, the oldest eleven years.

Bacteriological examination was made in but five cases, and in all of these general streptococcus infection was found, combined in one case with a general infection with the diphtheria bacillus. The associated disease was ascertained in eight cases. In four of these there was scarlet fever; in one diphtheria and scarlet fever; in two diphtheria, and in one endocarditis following abortion. In none of the cases was there any œdema, and in none was attention particularly directed to the kidneys during life.

Acute Hemorrhagic Nephritis. In this the chief lesions consist in hemorrhage accompanied by a varying degree of degeneration of the epithelium. Only three cases were met with. Two of these were from typhoid fever, and one from a case of acute endocarditis with infectious pneumonia. The character of the pneumonia was not described, but it was probably embolic. The hemorrhages in these cases were added to acute degeneration. In most of the cases the hemorrhage appears to take place from the glomerulus. In one case there was extensive hemorrhage in the tubules without any change in the glomeruli.

TUBERCULOUS OCCLUSION OF THE ŒSOPHAGUS, WITH PARTIAL CANCEROUS INFILTRATION.

By William Pepper, M.D., LL.D.,
DIRECTOR OF THE LABORATORY,

AND

D. L. Edsall, M.D.,
ASSOCIATE IN CLINICAL MEDICINE.

(*From the Pepper Laboratory of Clinical Medicine, No. 7.*)

On December 3, 1895, was admitted to the University Hospital a Russian cigarmaker, aged forty-two years, who had been seven years in America.

His family history had no bearing on the case, and was entirely good. His father died at the age of sixty-eight, of pneumonia. His mother was killed in an accident, and his brothers and sisters, five in number, were living and well. There was no history of consumption or cancer in near relatives.

His personal history up to March, 1895, was good, and he could remember no serious illness. He had never suffered any injury to the œsophagus. Syphilis was denied, and he had no evidences of it.

In March, 1895, he had a severe and somewhat protracted cold. From this he recovered, but noticed, almost at once afterward, a feeling of constriction and oppression in his throat. Later he found swallowing was becoming difficult, and increasingly so. Once, upon attempting to force down with his finger a piece of meat that had caught in his throat, he vomited, and the vomit contained blood. With this

Section from the junction of the cancerous and tuberculous tissues, showing the cancer-nests suddenly ceasing and replaced by fibrous tissue, with a good deal of round-cell infiltration, the latter here not showing any typical tubercles though somewhat clumped.

exception there was never vomiting, regurgitation, or discharge of blood. Severe pain was never present, and the history was solely that of dysphagia of increasing degree and with moderate loss of strength up to July, 1895. At that time his voice became weak and hoarse, and he found, for a time, he could not swallow even milk, and his strength failed so rapidly he had to give up work. Not long after he again became able to swallow liquids, but could never afterward take solid food. The hoarseness persisted and increased, as did the loss of flesh and strength, and in September he was admitted to the Jefferson Hospital, where the stenosis was diagnosticated and a gastric fistula established by Dr. Keen, with entirely successful operative result.

He recovered well from the operation and left there six weeks after admission, and had since been fed through the tube in his fistula. His general condition, however, grew worse, and upon admission to the University Hospital he was anæmic and much emaciated, his pulse weak and temperature subnormal, and his voice very weak and hoarse.

He complained only of his weakness, an absolute inability to swallow, and of a feeling of oppression in the chest that he could not exactly localize. He had, however, a frequent, hawking cough, with profuse expectoration, largely saliva, containing some thick mucus and pus. The examination of the œsophagus by bougie showed an impassable stricture at its commencement. The cervical glands were enlarged and two of them were softening.

Over the front of the chest on both sides the percussion-note was hyper-resonant. Posteriorly there was slight dulness at the vertebral border of the left scapula and beneath the ridge of its spine. Elsewhere the note was normal. The tactile fremitus was alike on both sides. Air seemed to enter both lungs equally, and the breath-sounds were themselves normal, but accompanied by some dry râles and inspiratory crackles in both apices posteriorly.

The heart-sounds were clear and rapid; the second sound accentuated. The cardiac dulness was of normal area.

The stomach-area, determined by percussion and auscultatory percussion, was somewhat enlarged, reaching from the fifth interspace downward to a finger's breadth above the umbilicus. There was a healthy gastric fistula holding a rubber tube.

Examination of his sputum for tubercle-bacilli was negative. His urine was normal in appearance and contained neither albumin nor sugar.

The examination of his blood showed 3,272,000 red corpuscles, 6250 white, and 40 per cent. hæmoglobin. He improved for a few days, and was examined by Dr. Grayson by laryngoscope. Dr. Grayson reported thickening of the ary-epiglottic folds and a complete occlusion of the œsophagus in the transverse diameter at its junction with the pharynx. The mucous membrane above was normal, and there was no ulceration, proliferating growth, or other evidence of malignancy. This led to the diagnosis of tuberculosis as the cause of stenosis. Especial thought was given to compression from enlarged glands, but from the situation and completeness of the occlusion it was held probable that there was at least a coexisting tuberculosis of the wall of the œsophagus. Operation was considered with the view of removing any glands that might be causing compression, and, if possible, reopening the lumen. His condition, however, was too bad to warrant operation, and it was deferred

while endeavoring to improve his general strength; but his cough increased and he began to show some irregular elevation of temperature, and the respirations grew more frequent. A few days after admission tubercle-bacilli were for the first time found in the sputum. He was losing weight and growing weaker. His breathing and voice were so weak that the lung-signs were difficult to elicit, but six weeks after admission there was added to his previous signs dulness, with prolonged expiration at the middle of the right scapula. At this time abscesses formed in the glands in the neck on the right side, and were opened. The pus showed no tubercle-bacilli, but many staphylococci. There was a continuous slight increase in the signs in the lungs and loss in weight and strength until, on March 18, 1896, he grew decidedly worse, with signs of catarrhal pneumonia of the right base. Next day this was outspoken and the left base was partially consolidated, and he died two days later.

The repeated examinations of his stomach-contents were carried out at various times after the administration of different test-meals—milk, milk and eggs, Boas oatmeal soup, and the same with egg-albumin added and the Ewald-Boas bread and water. The results varied but slightly at any time. On one occasion only, forty-five minutes after the administration of milk and eggs, was free hydrochloric acid shown by the phloroglucin-vanillin test, and this was but a faint reaction. The total acidity varied but little at any time, and was very low, ranging, expressed after the manner of Ewald, from 6 to 10. Quantitative estimations of the total hydrochloric acid by v. Jacksch's[1] modification of Sjoquist's method and that attributed by v. Leube[2] to Braun gave as its highest point 0.0329 per cent. and from this downward, some loosely combined chlorides always being present.

Lactic acid was never present, using both Boas's[3] and Uffelmann's test. Starches were not changed, and the gastric contents never showed any digestive action upon albumin, and tests for peptone at any interval were always negative.

The milk-curdling ferment was present, as was its zymogen, but both in small quantity and not active. With Boas's[4] method for their quantitative determination a dilution of 1 to 5 was sufficient to stop the action of the ferment and 1 to 15 of its zymogen. The motor activity seemed to be decidedly excited, as test-meals containing a pint of fluid and removed after fifteen minutes, half an hour, and so on to an hour and a half, showed, at the latter interval, never more than 3 or 4 c.cm., and only occasionally was there more remaining after one hour. After half an hour the quantity was usually about 20 c.cm. This was perhaps explained post mortem by the partial hour-glass contraction of the stomach. Probably more remained in the lower section, but could not be reached by the tube.

The results of the examinations for free hydrochloric acid are like those of Neschaieff,[5] who found it absent in four cases of cancer of the

[1] v. Jacksch: Klinische Diagnostik.
[2] v. Leube: Diagnose der Innerenkrankheiten, Bd. i. S. 272.
[3] Boas: Deutsch. med. Wochensch., 1893, No. 34.
[4] Boas: Diagnostik u. Therapie der Magenkrankheiten, Th. i., 3te Auflage, S. 189.
[5] Neschaieff: Lancet (abstract), June 4, 1887.

œsophagus. Ewald[1] also investigated the HCl production in a number of patients with cancer of the cardia upon whom gastric fistulæ had been made, and found it always absent whether the disease was upon the gastric or œsophageal surface of the cardia, and in a number of cases of the same nature examined by means of the stomach-tube he found the same lack of digestive activity. Combining these results with those of Neschaieff, he concluded that the introduction of food into the stomach through a gastric fistula would result only in its fermentation; he therefore advises that the fistula be established as near as possible to the pylorus, so that the tube, and thus the food, may be carried directly into the duodenum. On the contrary, Riegel[2] has examined two cases, Sidney Martin[3] one, and Boas[4] one, the location of the disease not mentioned; Mintz[5] three of the cardia and Boas[6] one in this location, in none of which cases was there any change in the HCl from the normal. In one of Mintz's cases the motor activity of the stomach was decreased, and in one no free HCl, but the combined chlorides normal, while Riegel[7] had a further case in which the secretion was at one time lessened but afterward normal.

There seems, therefore, no definite present knowledge of an ill effect of even cancer at the cardiac end of the œsophagus upon the gastric functions, while it would appear very unlikely that the pathological condition found in this case would have any specifically harmful action. The conditions found here seem much more probably due to the man's general condition and to the absolute nature of the occlusion, which not only prevented his taking nourishment in the normal manner and condition, but, perhaps more important, prevented the entrance of saliva into his stomach with or without his food, and the preparation of it by mastication. Sticker[8] found in a case with very poor secretion of saliva and symptoms of gastric insufficiency that the gastric symptoms quite disappeared and the patient was restored to full health within two weeks after re-establishing free secretion of saliva with jaborandi. He tested the condition of the gastric contents in another case after a test-meal administered through a stomach-tube, and after which no saliva was swallowed, and after the same meal masticated and swallowed with saliva, and found much better secretion and motor action after the latter. Biernacki[9] has elaborated the latter experiment, and Friedenwald[10] has

[1] Ewald: Klinik der Verdauungskrankheiten, 1893, Bd. ii. S. 148.
[2] Riegel: Zeitschrift f. klin. Med., Bd. xii. S. 434.
[3] Sidney Martin: Functional and Organic Diseases of the Stomach, p. 87.
[4] Boas: Deutsch. med. Wochensch., 1893, n. 39, 5.
[5] Mintz: Wiener klin. Wochensch., 1896, n. 3.
[6] Loc cit.
[7] Loc. cit.
[8] Sticker: Volkmann's Sammlung klinische Vorträge, 1887, 297.
[9] Biernacki: Zeitsch. f. klin. Med., Bd. xxi., Heft 1 u. 2; Zeitsch. f. Biologie, xxvii. S. 49-71.
[10] Friedenwald: Internat. Medical Mag., August, 1896.

repeated Biernacki's experiments, both administering first the test-meal without saliva, and, after expressing this, washing out the stomach; and administering the same meal with saliva Biernacki found, in health, the secretion of HCl and the motor activity much greater when the meal was masticated. Pepsin digestion was but little increased, and the absorption, tested by potassium iodide, was the same in either case. In a number of cases of disease, except in cases of gastrectasia and carcinoma and in pulmonary tuberculosis, he found the motor activity and secretion of HCl much increased, and the activity of the pepsin was even three times as great as with absence of saliva. Friedenwald got, in general, much the same results, and also investigated the action of the milk-curdling ferment and found it much greater when the meal had been masticated without saliva; it took from five to thirty minutes longer to coagulate milk.

This increased activity of the gastric functions is present even after the destruction of the ptyalin, as Biernacki has shown, and is therefore not due to this action, nor is it due solely to the presence of the saliva, as meals containing saliva but not masticated brought forth much less gastric action than those masticated. Biernacki holds this due to a regulation of the reaction of the food taking place within the mouth during mastication, while Friedenwald's experiments do not confirm this, and he simply refers it to an unknown effect produced during mastication.

That there is a definite increase of the gastric functions caused by mastication and in salivation can scarcely be doubted, and it seems probable that the experiments would have shown a greater increase had the diurnal variation in activity been excluded by making several observations upon each case with the two test-meals administered on separate days, instead of by administering both on the same day, the meal with saliva immediately following that without. The latter method would seem to the disadvantage of the meal with saliva.

The post-mortem conditions in our case were as follows:

Body much emaciated; fistulous opening in the epigastrium. The deep group of cervical lymphatic glands cheesy and suppurating.

Thorax: about 200 c.cm. of clear serum in the right femoral cavity; a small amount in the left.

Pericardium moderately distended with straw-colored fluid.

Heart: weight grm. 160; small and dark. The visceral pericardium wrinkled; subpericardial fat along bloodvessels white and gelatinous; valves healthy.

Lungs: right apex firmly adherent to the deep cervical tissues; on section contained a number of hard sclerotic and calcareous nodules. The lower part of the upper lobe normal. The middle lobe intensely œdematous; the lower lobe congested, œdematous, and irregularly consolidated in lobular areas. At its apex same thickening. The left apex less adherent, in other respects similar to the right; bullous emphysema

of the superficial portion; distinct lung-stones in places. Lower lobe similar to lower right lobe. At its topmost part consolidation of fibrous character, and on section tubercular-like areas.

Abdomen: firm adhesions between the stomach and abdominal wall for a half-inch about the site of the fistula; otherwise the peritoneum normal. Kidneys, suprarenals, and spleen normal. Liver small and congested.

The œsophagus, larynx, and stomach removed *en masse*. The *stomach* hour-glass shaped, due apparently to contraction of new-formed tissue at the seat of operation. The pyloric part of the stomach the size of a small orange; the part above the constriction—the body and fundus—was alone about the size of a normal organ. It contained gas and curds of milk.

The *œsophagus:* patulous and normal as high up as the level of the arch of the aorta. Above this point and to the junction with the pharynx—to a point just beneath the vocal cords—the lumen had entirely disappeared and its situation could not be traced. The surrounding tissues and œsophageal walls had formed a band of firm fibrous tissue about a half-inch in thickness and one and a half inches in breadth. The whole mass was firmly bound to the vertebræ.

The *larynx:* the ary-epiglottic folds were thickened and œdematous. Cricoid cartilage thickened.

Pathological diagnosis: tuberculosis of the larynx, cervical glands, œsophagus (?), and lungs, deglutition-pneumonia. Upon microscopic examination of the lungs was found the confirmation of the macroscopic diagnosis. At the apices was great thickening, with obliteration of many of the air-spaces, and thickly scattered throughout the tissue were many collections of round- and giant-cells, a few of which masses were becoming cheesy in the centre. In the lower lobes catarrhal pneumonia, with occasional miliary tubercles.

The sections of the growth from portions taken from the junction with the normal mucous membrane show at once cancerous tissue in a general fibrous tissue-basis. The fibrous tissue is exceedingly dense, arranged in bands with a little areolar tissue between the bands, and in this areolar tissue and about the cancer-nests there is a marked, often quite dense, round-cell infiltration, here and there somewhat in clumps, but not characteristic. The epithelial cells are, at the periphery, almost entirely in cancer-nests, in some places irregularly scattered and seemingly remnants from the œsophageal mucous membrane. Below the free edge there is not so distinct an arrangement in nests of cells, but there are long tongues of cancerous tissue extending into the here still more compact fibrous tissue. There is an extremely large number of pearly bodies in and near the cancer-nests and prolongations; in a few of the nests a good deal of formless débris, or a goodly number of round-cells among the epithelial. In numerous places there are well-defined clusters of round-cells, with sometimes a few rather irregularly arranged epithelial cells in or near the centre, sometimes a distinctly formed nest at this point. Sections from deeper within the general mass show, at the end toward the free edge, the process in much the same condition as in the deeper portions of those described—the cancerous tissue mostly in the form of prolongations, with many pearly bodies; much fibrous tissue, irregularly arranged; and still much round-cell infiltration, though not so dense as in the free edges. This ceases

rather sharply, and the fibrous tissue beyond is arranged transversely and in distinct bands, separated by areolar tissue, all freely infiltrated with round-cells, but showing almost no cancerous tissue. In some sections there are no epithelial cells, separate or in groups; in some one or two small nests, and in some three or four, but never a large number. But the round-cells here, and more especially on the lateral borders, assume a more interesting character. They are frequently collected in small, dense masses, sometimes not well outlined, but occasionally well defined and irregularly round, with an occasional giant-cell near or beyond the periphery of the group. Some of these tubercle-like masses are undergoing fibroid change. Many are situated at a distance from the cancerous tissue, so that they do not seem dependent upon its irritant action for their formation, and they are largely at the lateral borders.

Sections were stained several times for tubercle-bacilli, without positive result; but some were finally found in which there were two or three of the bacilli to a slide. These were all near the exterior of the growth and in the neighborhood of the tubercles.

From these appearances the original cause of the disease was evidently tuberculosis, while the cancer subsequently infiltrated the occlusion. That the cancer was primary is very improbable, both from its evident appearance, microscopically, of infiltration of a previously existing mass and from the history of cancer being here as elsewhere one of inexorable growth and onward progress, ulceration, and sloughing. Here the central fibrous portion, at least, is in all active effects healed.

The possibilities that the stenosis might have been originally syphilitic or subsequent to trauma seem excluded by the lack of history of syphilis and of its clinical or post-mortem lesions, and, as to trauma, only a very extensive injury could have produced so extended contraction, and this must have left a vivid memory of its occurrence, while he stated that he had suffered from no injury.

That the original tubercular disease had occasion for its origin given by partial obliteration of the lumen by an enlarged gland and abrasion of the projecting portion is possible. But, although the suggestion of the possibility of obstruction of the œsophagus by enlarged glands was first made by Vesalius, the number of cases in which this condition has been found is small. Barety,[1] in twenty-six cases of compression of important structures by bronchial glands, found the œsophagus involved but once; while Hofmokl,[2] who had two cases, could find but one other to add to the list, and that not severe.

Körner[3] considerably increased these figures two years later with two cases of his own, of which, however, but one was examined post mortem, and nine others from literature. If to these be added Habershon's, which Körner mentions, but leaves out of the count, Barety's

[1] Barety: L'adénopathie trachéobronchique.
[2] Hofmokl: Archiv f. Kinderheilkunde, 1882-'83, iv. S. 81-87.
[3] Körner: Deutsch. Arch. f. klin. Med., 1885, n. 37.

and one reported by Janeway,[1] the known number at that time remains very limited. This consideration would, however, include only those cases in which there is compression. Traction from contracted glands, which did not exist in our case, is far more frequent.

Microscopic findings resembling ours have been described but three times, and of these the account of Tissier[2] is an incomplete one of a cicatricial contraction of the œsophagus at the level of the tracheal bifurcation, with a fistulous opening into a pouch caused by suppurating bronchial glands, which pouch also communicated with the right bronchus. The upper and lower borders of the stenosis showed slight cancerous infiltration. Further description is not given. Cordua[3] and Zenker[4] have reported each a case of cancer in which miliary tubercles and tubercle-bacilli were present. Both, however, believed the tuberculosis was secondary to the cancer—Cordua thinking the tubercular infection came from the lungs through the lymph-channels, while Zenker gave the much more acceptable etiology of destruction of the mucous membrane by the cancer, thus giving entrance to the bacilli from the lumen of the œsophagus.

Tuberculosis of the œsophagus, of itself, is somewhat more common, though still very rare. Many works on pathology, as Cornil and Ranvier,[5] Ziegler,[6] Hamilton,[7] and others dismiss it with the note of its occurrence and rarity, or do not mention it at all. Orth[8] gives it consideration and thinks it more common than usually supposed. He has himself observed three cases which were confirmed by microscopic examination, and in two of them tubercle-bacilli were found.

Birch-Hirschfeld[9] has observed in a man dead of tuberculosis of the lungs tuberculous ulcers of the larynx, pharynx, and upper third of the œsophagus.

Of clinical works Cohen[10] mentions it as a cause of stricture, Osler[11] refers to it as a pathological curiosity, while v. Leube,[12] Strümpell,[13] Eichhorst,[14] and others do not mention it.

Such statistics as are available warrant this treatment, the most extensive being those of v. Willigk[15] and Sänger.[16] The former examined

[1] Janeway: Trans New York Path. Soc., November 27, 1872.
[2] Tissier: Annales des maladies de l'oreille, du larynx, du nez et du pharynx, Nov. 1887.
[3] Cordua: Arbeiten aus dem Patholog. Inst., Göttingen, 1893, S. 147.
[4] Zenker, K.: Deutsch. Arch. f. klin. Med., Bd. xvii. S. 191.
[5] Cornil and Ranvier: Manuel d'histologie pathologique.
[6] Ziegler: Lehrbuch der Pathologischen Anatomie.
[7] Hamilton: Text-book of Pathology.
[8] Orth: Allgemeine Pathologie, 1887, p. 681.
[9] Birch-Hirschfeld: Pathologische Anatomie, Spec. Th. 2te Hälfte, 4te Auflage, S. 620.
[10] Cohen: Ashhurst's Encyclopedia of Surgery, vol. ii.
[11] Osler: Practice of Medicine, p. 240.
[12] v. Leube: Diagnose der Innerenkrankheiten.
[13] Strümpell: Pathologie u. Therapie der Innerenkrankheiten.
[14] Eichhorst: Specielle Pathologie u. Therapie.
[15] v. Willigk: Prager Vierteljahresschrift, 1856, xiii. 2 u. 3.
[16] Sänger: Archiv f. Heilkunde Jahrgang, xix. S. 448. Anmerkung.

1317 records and found but one case, while Sänger found five cases in 1226 records. He included the cases reported by Chvostek[1] and Paulicki,[2] which were not verified by microscopic study, and the one case v. Willigk found was not verified.

K. Zenker[3] considered this infrequency due to the short time the ingesta remain in the œsophagus, and, more especially, to its thick layer of epithelium, which prevents, in ordinary conditions, the abrasions which might give entrance to the bacilli. In support of this, and as evidence of the *rôle* played by injuries of the mucous membrane, he refers to the cases reported by Breus,[4] occurring subsequent to the destruction of the mucous membrane by swallowed lye; Eppinger,[5] where the tuberculosis was found beneath a mass of thrush, and Kundrat, in which the original injury was due to sulphuric acid; and, further, to his own case and Cordua's, previously mentioned, in which cancerous ulceration preceded the development of tuberculosis. Cases have, nevertheless, been reported since 1716, when Mangetus[6] described a case of which a meagre abstract is given by Mauchart in his dissertation on "Struma Œsophagi." The diagnosis of the condition was at that early date impossible, of course. It was described, however, as a complete occlusion of the œsophagus for several inches by its conversion into a fibrous band, all lumen having disappeared. This was thought to be due to pressure from enlarged glands and their subsequent contraction, including the œsophagus, the whole mass becoming fibrous. This description bears great resemblance to our case, but must end with resemblance. Beuller's case, which Mauchart reports at the same writing, can be dismissed at once as in all probability cancer with gangrene of neighboring organs.

Sommer's[7] case, reported undiagnosticated, was perhaps cancer, but at this day would have been worthy of careful study. There was an ulcer of the pharynx with a callous base, and in the œsophagus just below this were a number of tubercles containing cheesy matter. Some of these had ruptured and left superficial ulcers. There was an opening below communicating with the trachea, and the mucous membrane of the latter was ulcerated in spots. The other organs were normal.

Subsequent to this report the literature is barren of suggestive cases until those of Chvostek[8] and Paulicki[9] in 1868. Both of these showed ulcers of the œsophagus of distinctly tubercular, gross appearance and

[1] Chvostek: Oesterreich. Zeitsch. f. praktische Heilkunde, xiv. S. 497.
[2] Paulicki: Virchow's Archiv, Bd. xliv. S. 373.
[3] Zenker, K.: Deutsch. Archiv f. klin. Med., 1895, lv. Festschrift.
[4] Breus: Wiener med. Wochensch., 1878.
[5] Eppinger: Prager med. Wochensch., 1881, n. 51 u. 52.
[6] Mangetus: Theat. Anat., 1716. Quoted by Mauchart, Haller's "Disputationes Chirurgicæ," 1743.
[7] Sommer: Rust's Magazine f. d. gesammte Heilkunde, 1823, xv. S 364.
[8] Chvostek: loc. cit.
[9] Paulicki: loc. cit.

in tubercular subjects. Chvostek's, however, does not appear to have been examined microscopically, while Paulicki could only exclude cancer by his histological examination, and could not find any distinct evidence of tuberculosis. Kraus,[1] in the following year, published as tuberculosis a case in which he found an ulcerated "tubercular" ring, two inches in width and four inches above the cardia, and which communicated by a small opening with cavities in the middle and lower lobes of the right lung. The ulcer showed a variety of what he considered tubercular stages. The case is certainly suggestive, but on these doubtful appearances and in the absence of microscopic examination it cannot be positively considered tubercular. The next case, that of Breus,[2] is the first one with really strong claims to acceptance. In this there were ulcers of the pharynx, œsophagus, and stomach, in a case of generalized tuberculosis, and the histology of the œsophageal ulcers was that of tuberculosis. There was a history of injury from drinking lye and of stenosis coming on subsequent to this.

A case of Peter's[3] seems very probably actual tuberculosis, though only the gross lesions were described. They were: stenosis from drinking sulphuric acid, with several tubercular-like ulcers in the œsophagus, in a subject with pulmonary and intestinal tuberculosis. Eppinger's[4] seems almost secure in diagnosis—a woman with advanced phthisis and with her œsophagus almost stopped up with a mass of thrush. Beneath this were found tubercles and tubercular-like ulcers over the entire length, and the histological appearance was that of tuberculosis. Adding to these the cases of Spillmann[5] and Frerichs[6] quoted by Flexner, of which Frerichs seems especially probable, we reach the stage when the existence of tuberculosis of the œsophagus was fully demonstrated by Weichselbaum[7] by his discovery of the presence of the bacilli in his case, which showed the following conditions: tubercular enlargement of the supraclavicular and mediastinal glands, a moderate degree of tuberculosis of both lungs, and a few ulcers in the ileum. Three finger-breadths above the bifurcation of the trachea there were four minute openings in the trachea and eight in the œsophagus. These communicated with purulent glands between the trachea and œsophagus; above and below this, down to the cardia, there were myriads of small tubercles, gray or cheesy, and many tipped with small ulcerations. Two more were reported by Beck[8] of generalized tuberculosis, with involvement of the œsophagus, in one of which it apparently extended from

[1] Kraus: Allgemeine med. Zeitung, 1869, n. 19.
[2] Breus: loc. cit.
[3] Peter: Leçons de clinique Médicale, 1879, t. ii.
[4] Eppinger: loc. cit.
[5] Spillmann (quoted by Flexner): De la tuberculisation du tube digestive. Thèse, Paris, 1878, p. 97.
[6] Frerichs (quoted by Flexner): Beiträge zur Lehre v. d. tuberculose, 1882.
[7] Weichselbaum: Wiener med. Wochensch., 1884.
[8] Beck: Prager med. Wochensch., September 27, 1884.

the pharynx. These were fully verified. Carstens[1] makes the doubtful and unproved statement that there are in the post-mortem records at Kiel three undoubted cases of tuberculosis of the pharynx and two more that are probably such. Mazzotti[2] examined three cases, one of miliary tuberculosis with miliary tubercles in the œsophagus, one of advanced tuberculosis of the lungs with ulceration low down in the œsophagus and tubercles higher up, and a third, likewise of advanced pulmonary phthisis, with added intestinal tuberculosis. Here the œsophageal disease was in the form of a ring of elevated tissue of about three-quarters of an inch in diameter. Below this were a number of fine swellings. In all three cases he found tubercle-bacilli and the appearances of tubercular disease under the microscope.

To these must be added the three cases which Orth[3] mentions, in two of which the diagnosis was completed by the discovery of the bacilli and the third presented all the histological appearances of tuberculosis, and the case of Birch-Hirschfeld, previously cited. Flexner[4] added a case in which there was the interesting clinical observation that in washing out the pleural cavity, after resection of a rib for pyopneumothorax, portions of previously ingested food came away in the washings. Post mortem he found tuberculosis of the cervical and bronchial glands, tubercular pleurisy with pyopneumothorax, gangrene of the pleura, and intestinal tuberculosis of recent origin. In the œsophagus were found a large perforation into the pleura through one ulcer and another ulcer which reached only to the muscular coat. The edges and bases were smooth. Living maggots were found in the ulcers. Histologically, the non-perforating ulcer had undermined the mucous membrane and submucosa, which were lined with a layer of epithelium extending onto its base. In this projection in the base of the ulcer and in the smooth muscular fibres there were masses of epithelioid and lymphatic cells with some giant-cells. In the perforating ulcer likewise were tubercles found. The bacteriological examination was confirmatory. Zenker's[5] three cases were reported recently. In the first the diagnosis had been made during life from dysphagia occurring in a case of pulmonary tuberculosis, with enlarged glands in the neck and with subsequent extreme pain on swallowing, radiating toward the ears. The sound met an impassable obstruction 22 cm. from the teeth. Post mortem there were in the lungs all stages of tuberculosis, with cavities in the apices. The œsophagus was stenosed from the level of the cricoid for 4 cm. downward, admitting only the finger-tip. There was within this a ring-like ulcer encircling the whole circumference, the edges of

[1] Carstens: Beiträge z. Lehre u. Statistik der Oesophagusgeschwüre. Inaug. Diss., Kiel, 1887.
[2] Mazzotti: Rivista clinica, Januar, 1885.
[3] Op. cit.
[4] Flexner: Johns Hopkins Hospital Bulletin, 1898, No. 28.
[5] Zenker, K.: Deut. Archiv f. klin. Med., Bd. lv., 1895, Festschrift.

which were irregular, warty, and somewhat undermined. The base seemed cicatricial tissue. It was very tightly adherent to the last three cervical vertebræ, and the tissue here looked exactly like scar-tissue. The ulcer involved only the mucous membrane. In the middle of the œsophagus was a swelling the size of a bean, discharging thin pus.

Under the microscope, surrounding the ulcer the epithelium was much thickened, and there were prolongations running out into the mucous membrane, but never reaching beyond it—the same picture as in lupus of the skin. At the beginning of the ulcer itself the epithelial covering ceased and there was round-cell infiltration, with occasional epithelial tongues left from the destruction of the mucous membrane. The whole was filled with round-cell infiltration in which there were many tubercles, which were especially characteristic in the base of the ulcer. Many contained numerous giant-cells which were mostly of lymphoid tissue; many others were largely made up of epithelioidal cells. Some others were small necrotic masses. Both in the tubercles and granulations were many tubercle-bacilli, sometimes in great numbers, and especially on the surface of the ulcer. They were often enclosed in the cells. The process was localized to the mucosa and submucosa, though there was a little round-cell infiltration of the muscular layer. The purulent swelling was a tubercular mass.

In connection with his previously mentioned emphasis of the causative part played by traumatism, he reminds us that the part here affected is especially liable to injury from its situation just back of the cricoid.

His second case presented no œsophageal symptoms, and was accidentally discovered. There was advanced tuberculosis of the lungs, trachea, larynx, and intestines. Opposite the bifurcation of the trachea was a slight narrowing of the œsophagus, and at this point there was a prominence with an ulcer the size of a finger-nail at its top. Surrounding this were small, yellowish masses. The whole thickness of the swelling was filled with caseous matter and tubercles were seen at a little distance. Enlarged and infiltrated bronchial glands surrounded it, and the process was evidently due to an extension from them. The further examination showed typical tubercles and tubercle-bacilli in large number.

In the third case the lungs, pleura, and intestines were tuberculous and there was a mass of tubercular glands in the neck. Three perforations existed in the œsophagus near its central portion, communicating with the bronchi and trachea. About these the mucous membrane was infiltrated and yellow. The tissue here was full of tubercles, necrotic granulation-tissue, and tubercle-bacilli.

Fränkel[1] published a case not long since of a man dying of pul-

[1] Fränkel: Münch. med. Wochensch., 1896, n. 2.

monary and intestinal tuberculosis, in whose œsophagus were many tubercles, some superficially eroded, and a large number of small ulcers. The microscopic appearance was that of tuberculosis, with occasional cheesy degeneration, in all tissues down to the muscular layer. Giant-cells and tubercle-bacilli were present in small numbers.

Glockner[1] has given a description of a rare localization of the process, the muscular layer only being affected; and Daniel,[2] most recently, examined the organs of a woman aged seventy-six years, confirming a clinical diagnosis of pulmonary tuberculosis with broncho-pneumonia, and finding also an ulceration, nearly four inches in length, of the posterior wall of the œsophagus, with excavated base, which was eroded and of reddish color. At its margin and in the neighborhood were many miliary granulations. Like granulations of less number were present on the anterior wall up to near the pharynx. At the crossing of the right bronchus was a circular opening, almost 1 cm. in diameter, communicating with a cavity formed by a broken-down and discharging peribronchial gland. The stomach was dilated, its mucous membrane slate-colored, and it contained numerous granulations of apparently tuberculous nature.

Further, the case published by Heryng[3] in 1892 of "tuberculosis of the œsophagus resulting in recovery" is of interest, but inability to procure an abstract in a familiar language prevented examination of the diagnosis, which must have been very insecure without a study of possible removed portions.

Of those cases described, none before Breus give sufficient evidence of their nature for acceptance as diagnosticated. To add to the errors possible, there are cases of sarcoma of the œsophagus reported by Miller,[4] Rolleston,[5] Chapman,[6] Oppenheimer,[7] Ogle,[8] Targett,[9] and Shaw,[10] among which the last two are of especial interest. Targett's exhibited an extensive and advanced tuberculosis of the lungs and a marked thickening of the œsophageal wall for several inches, the surface of this thickening being ulcerated; while Shaw's was likewise an ulcer beginning one inch below the cricoid and extending downward for three inches. In both cases the microscope showed sarcoma, chiefly of round-cells.

With Breus the security of the diagnosis becomes, it seems to us, sufficient for its acceptance, and certainly in all the cases subsequent to

[1] Glockner: Prag. med. Wochensch., 1896, n. 11–13.
[2] Daniel: Journ. de Sciences médicale de Lille, 1896, n. 22, p. 530.
[3] Heryng: Gaz. lek. Warszawa, 1892, 2, S. xii., 678.
[4] Miller. Trans. Med. Soc. of Pennsylvania, 1884.
[5] Rolleston: Trans. Path. Soc. of London, vol. 44, p. 65.
[6] Chapman (quoted by Butlin: "Carcinoma and Sarcoma," p. 160).
[7] Oppenheimer: Louisville Med. News, 1879, vii. p. 74.
[8] Ogle: British Med. Journ., March 31, 1896.
[9] Targett: Trans. Path. Soc. of London, vol. 40, p. 76.
[10] Shaw: Ibid., vol. 42, p. 90.

his, with the exception of those of Spillmann, Frerichs, and Peter. The two latter, in the apparent lack of microscopical examination, must be considered doubtful. The original report by Spillmann has not been accessible to us, but from Flexner's description there would seem to be much doubt of its nature.

Certain other cases, such as those described by Vigla,[1] Löschner,[2] Uhde,[3] Voelcker,[4] Zenker,[5] Pitt,[6] and Penzoldt,[7] in which there was perforation of the œsophagus, caused, except in Vilga's case, by abscesses of probable tubercular origin, can scarcely be considered because of the lack of description of any gross or microscopic lesions pointing to tuberculosis, but that there was tubercular infiltration of the wall in some of these cases is almost indubitable. As to the diagnostic significance of the examination of these cases there is little to be said. If a case of phthisis exhibit painful deglutition, and especially with evidence of some stenosis, a suspicion of tuberculosis of the œsophagus would be aroused, and the not infrequent occurrence of the disease at the uppermost portion of the gullet would point to the use of the laryngoscope as an aid, as in our case, in the establishment of a clinical diagnosis. Stenosis is not common, however, as beyond our report only those of Paulicki, Spillmann, and Zenker (in his first case) contain any description of it in distinct degree due apparently to the tubercular process, unless Mangetus's ancient but interesting case be seriously considered in this connection. This latter seems to offer the only marked parallel to ours in mechanical results from any cause. A goodly number of very extreme cases of stenosis may be found, as in Schomaker's,[8] where there was in a boy of nine years a stenosis two inches in length admitting only a pin, the walls of the œsophagus being much thickened by scar-tissue; and in Shaw's,[9] where a squamous epithelioma shaped like a flattened cone two and one-half inches in length, ragged and sloughing at its free border, choked up the whole lumen. Veggia[10] had a patient whose œsophagus was so narrowed that she had to be nourished by the rectum. Post-mortem examination showed a hard, fibrous ring at the cardia that admitted only a No. 1 sound.

Pollock[11] quotes a case of Liston's, of external stenosis of the pharynx, in which there were an approximation of the upper horns of the thyroid

[1] Vigla: Union Médicale, 1855, p. 290.
[2] Löschner: Virchow's Jahresbericht, 1868, ii. S. 643.
[3] Uhde: Deutsche klinik, 1856, n. 3.
[4] Voelcker: Trans. Path. Soc. of London, vol. 42, p. 87.
[5] Zenker: v. Ziemssen's Handbuch d. Spec. Pathologie u. Therapie, Bd. vii., Th. 1., Anhang, p. 187.
[6] Pitt: Trans. Path. Soc. of London, vol. 39.
[7] Penzoldt: Virchow's Archiv, Bd. lxxxiii. p. 488.
[8] Schomaker: St. Petersburger med. Wochensch., 1889, n. f. vi. p. 116.
[9] Shaw: Trans. Path. Soc. of London, vol. 42, p. 89.
[10] Veggia: Gazetta medica di Torino, 1889, p. 385.
[11] Pollock: Holmes's System of Surgery, 2d ed., vol. iv. p. 491.

and great hypertrophy of the constrictions of the pharynx, the stenosis allowing only the passage of a goose-quill. The patient had been under Cruikshank and John Hunter and treated for a long time, and died at nearly eighty years of age. Harvey[1] published an interesting report of stenosis that would admit only a No. 2 urethral bougie, which was caused by drinking concentrated sulphuric acid forty years before, and was practically cured by treatment.

Roe[2] had a case of fibroid stricture in which the lumen was of the size of a small lead-pencil, and quotes Poncet,[3] who had described a stenosis admitting only a very fine probe, the cause of which was hypertrophy of the muscular layer. Not many other cases of such extreme degree of obstruction have been published, and this is not surprising, since the disease, if cancer, and the interference with the nourishment of the patient, are usually sufficient to cause death before this grade is reached.

The conditions found in our case under the microscope have, further, an interesting connection with the question of the relation of cancer and tuberculosis in the same organism, and especially that question of the relation between stenosis of the œsophagus, usually cancerous, and tuberculosis.

Rokitansky's original contention, in which he was followed by the Viennese school, that the two diseases were antagonistic, soon brought forth an answer from Lebert,[4] who insisted that even the opposite was true, and he especially emphasized the view that tubercular subjects have an actual predisposition to cancer of the œsophagus. Behier[5] was quite as vehement in expressing the same view. Hamburger[6] and Fritzsche followed this opinion, and Hamburger even believed any chronic affection of the œsophagus in a tubercular subject should be always very suggestive of cancer. In the light of the cases of tuberculosis of this organ that have been considered, and after examination of statistics, this latter view is entirely untenable.

It has been the province, however, of numerous French writers to defend the view that tuberculosis occurs with especial frequency in stenosis of the œsophagus from any cause, the usual cause being, of course, cancer. Peter[7] was convinced of this, and relates four of his own cases, one of which was not examined post mortem, but had stenosis of the œsophagus with clinical signs of phthisis. Another, with a fibrous stricture, showed post mortem recent miliary tubercles. The third had

[1] Harvey: Birmingham Med. Review, 1889, p. 225.
[2] Roe: New York Medical Journal, March 14, 1891.
[3] Poncet (quoted by Roe): Bull. Méd., Paris, 1888, ii. 451.
[4] Lebert: Traité pratique des maladies cancéreuses, 1851.
[5] Behier: Clinique médicale, 1864.
[6] Hamburger: Medizin. Jahrbuch, 1869, n. 18.
[7] Peter: Leçons de clinique médicale, 1879, t. ii.

cancer, and at the apices of the lungs were granulations that appeared tubercular. The fourth case was the one previously mentioned under tuberculosis of the œsophagus. He further refers to a case of Gallard's, where there was cancer of the stomach and œsophagus, with pulmonary tuberculosis, and says he has seen tuberculosis in each case of fibrous or cancerous stricture he has observed. The cause of this supposed frequency he finds not in a particular effect of cancer itself in this situation, but in the inanition resulting from the insufficient nourishment possible in such cases, and refers to v. Jaksch's not very convincing statistics of tuberculosis combined with gastric ulcer as materially reinforcing this belief.

Letulle[1] and Leroux[2] reported cases of carcinoma with tuberculosis, and Leroux affirms that this evidences the possibility of a cancerous individual becoming tuberculous, but doubts the opposite, though an example of the latter is shown in Letulle's case in the same number of the journal. Michaux[3] had a case similar to Leroux's.

Porchaire[4] examined the records of the Anatomical Society of Paris from 1870 to 1880 and found twenty cases of cancer of the œsophagus, nine of which showed tuberculosis, in one case of the testicle alone, in another the process was old and healed; of two cases of cicatricial stricture one subject was tuberculous. He himself reports the case of a man, sixty-one years of age, who had developed upon the symptoms of carcinoma of the œsophagus those of pulmonary and, finally, general tuberculosis. The autopsy showed tubercles in the lungs, kidneys, spleen, and membranes of the brain, and a carcinoma of the œsophagus. Tissier[5] likewise agrees with Lebert and Behier that the frequency is great, and adduced, as an example, his case previously described in this paper; and, finally, Parmentier[6] had a case of cylindrical-celled cancer of the œsophagus in which there were both old and recent tuberculosis. In Michaux's case only is a microscopical examination of the tubercular condition mentioned, and this was not complete, but most of the cases had fairly complete macroscopic evidence of their nature. Opposed to these cases are the statistics published by Petri,[7] who found tuberculosis in but four out of twenty-four cases of carcinoma. Lubarsch's[8] statistics are much more favorable to the French view, including forty-seven cases of cancer of the œsophagus, of which eleven showed lesions of tuberculosis as well. When it is considered, however, that he insists,

[1] Letulle: Bull. de la Soc. Anat. de Paris, 1877, lii.
[2] Leroux: Ibid.
[3] Michaux: Ibid., 1879, liv.
[4] Porchaire: Tuberculose consécutive au rétrécissement cancéreux de l'œsophage. Thèse, Paris, 1883.
[5] Tissier: Annales des maladies des l'oreille, du larynx, du nez et du pharynx, Nov. 1887.
[6] Parmentier: Archiv. général de méd., 1889, i. p. 470.
[7] Petri: Krebs d. Speiseröhre. Diss., Berlin, 1868.
[8] Lubarsch: Virchow's Archiv, Bd. cxi. S. 280.

and justly so, that all tubercular lesions, wherever situated, must be included, and not alone those of the lungs, as many had previously done in considering this question, it must be admitted that even this percentage of 23.4 would indicate rather its rarity than the opposite.

Hence, as far as statistics may be followed, there seems no causal relation on this point, though Peter's suggestion of the provocation of tuberculosis by the insufficiency of nourishment is certainly one that must have a positive bearing upon the question, and, in our case, the tuberculosis seems to have been regenerated in this way

In the wider question of the relation of the two diseases in general, the original dictum of Rokitansky has disappeared from the argument, and the greater tendency now is to a magnification of the *rôle* of local tuberculosis in the causation of cancer. Ribbert[1] takes the most extreme view on this point, and would make the causal relation a very intimate one. He holds, first, that the origin of cancer is due to the early proliferation of the connective tissue and its growth into the epithelial layers, finally cutting off portions of the epithelial cells, rather than to the primary growth of the epithelium itself. He supports this with the statement that Koster told him he had frequently found tuberculosis in malignant tumors of the chin, lower lip, and breast (but that they had never been carefully examined owing to the carelessness of an assistant), and with the description of eleven cases which he had examined, which showed typical cancer alveolæ in a tissue much infiltrated with round-cells and containing many or fewer giant-cells in the different cases. While the round-cells were occasionally collected into tubercle-like aggregations, in some cases they were not. In two of the cases the cancerous infiltration was but slight, while the tuberculosis—if such—was already well advanced. The descriptions are, however, solely of the local condition and are by no means convincing of the existence of tuberculosis there, and bacilli were not found in any case. As Clement[2] points out, the condition would strongly suggest a "foreign-body tuberculosis."

The more general view is to consider a local tuberculosis as predisposing to cancer in the same way that other sources of chronic irritation are known to do this, as the frequent pipe-smoker's cancer of the lip and the scrotal cancer of the chimney-sweep, or, more to the point, those that occur on the site of the chronic leg ulcers. Cordua and Zenker, as mentioned, have reported cases of the two combined in œsophageal ulcerations, in which as in Lubarsch's[3] case, occurring in the ileum, and in Baumgarten's,[4] of the rectum, the tuberculosis was

[1] Ribbert: Münch. med. Wochensch., 1894, n. 17.
[2] Clement: Virchow's Archiv, Bd. 139.
[3] Lubarsch: loc. cit.
[4] Baumgarten: Centralbl. f. Bacteriologie u. Parasitenkunde, 1894, xv.

apparently secondary to the carcinoma, and Clement[1] noted the frequency of tuberculosis in certain parts—especially certain lymphatic glands, as in the axilla—when carcinoma existed near by, while these same structures are usually rarely affected. But Crone[2] and Baumgarten[3] have reported quite typical chronic tuberculosis of the larynx with secondary carcinoma in the same tissue, and Hildebrand[4] a case of primary sarcoma of the lung and one of primary carcinoma of the same organ, in both of which the growths were situated near tubercular lesions, and, he thought, probably caused by them.

It is in lupus vulgaris, however, that this combination has been most frequently met with, and many men would make lupus a much more specific cause of cancer than the simple forms of inflammation, because of the peculiar form of interpapillary growths of the epithelium which may extend well into the subjacent tissues, even as far as the bone, according to Busch, and may show great numbers of pearly bodies, while the clinical cause remains entirely non-malignant. It is only when the ingrowths lose their limiting-membrane and form atypical nests that malignancy is developed, and this even does not seem always to determine the nature of the disease, so that Bayha[5] would make the diagnosis in these intermediate cases depend more upon the clinical course than upon their histological character. He quotes cases described by Lang and Kaposi as similar to one of his own, and gives an interesting description of the latter; those portions of the tissues which were not cancerous, but in the immediate neighborhood of the cancer, showed most prominently an extreme change of the papillæ. They were markedly enlarged, partly long and narrow, like intestinal villi, partly broad and rounded. There was much round-cell infiltration, and here and there clusters of these cells which were often divided off from their surroundings by spindle-cells. The corium was much thickened and in the deeper parts the diffuse infiltration ended, and there were here many small masses of round-cells of irregular shape, and these especially accompanied the vessels. The epithelium showed great atypical growth, the cells in the heavy layer being particularly so much increased that they filled nearly all the spaces between the overgrown papillæ, and, as these latter often touched at their ends, there appeared isolated epithelial masses. Some small, sharply bounded epithelial prolongations reached deeply into the parts of the corium, showing the lupus-infiltration. There was a great tendency everywhere to form pearly bodies.

In the cancerous parts there was a suggestion in spots only of typical

[1] Clement: loc. cit.

[2] Crone: Centralbl. f. Bacteriologie u. Parasitenheilkunde, 1894, xv. p. 377.

[3] Baumgarten: Arbeiten aus dem Pathologisch-Institut zu Tubingen, Bd. ii. Heft 1.

[4] Hildebrand: Zwei fälle v. primär. malignen lungentumoren im auschluss au lungentuberculose. Inaug. Diss., Marburg, 1887.

[5] Bayha: Beiträge zur klin. Chir., Bd. iii. Heft 1.

epithelium. There were many typical cancer-nests and prolongations both in the superficial and deep parts, the remaining tissue being infiltrated diffusely with round-cells and tubercles, and in places he found, he thought, evidence of the direct replacement of the tubercles by cancer-nests; in some parts he saw a few epithelial cells scattered through a tubercle; again, a typical nest forming in the centre of a tubercle; elsewhere masses of round-cells, cancer-cells, and granular débris from cell-destruction. Extending to these collections were prolongations from cancerous nests. This description is very like some of the appearances seen in the sections from our case, in the portions that are cancerous, the epithelial prolongations communicating with aggregations of epithelial cells—sometimes but few in number, often a small nest, and, again, quite well-formed, large alveolæ, and often in these nests shapeless material that looks like degenerated cells; and these epithelial cells, in whatever form, are frequently surrounded by an especially thick collection of round-cells, often appearing much like a well-limited original tubercle. It is difficult to convince one's self, however, that this appearance is not caused by the irritation of the newly forming cancer-nests rather than by pre-existing tubercles which are succumbing to the advancing malignant disease.

Bidault[1] held, however, much the same view, maintaining that cancer may arise from lupus-scars or from a florid and advancing case; and Raymond[2] followed him, collecting fourteen cases, three of which were his own, in which cancer arose from a florid lupus; while Nithak[3] compiled thirty-two cases arising from the active disease. These figures are, however, much damaged by the claim of many others and Bidault's own admission that there exists some scar-tissue in any case of lupus, and from this might arise a cancer that seemed to appear on the basis of actively inflamed tissue. There seems, in consideration of the vast number of cases of lupus that have been under careful observers without mention of malignancy, no reasonable ground for believing that even lupus, the most favored subject for this contention, causes any especial tendency of its own to cancer. It certainly does act as the starting-point of malignant growth, but all published knowledge would tend toward keeping it in the general class of chronic irritants.

Lubarsch[4] has recently investigated the statistics of the general question of the lesions of the two diseases in the same individual, and again considers those of Cohen, who found but one combination in fifty cases of phthisis and thirty of cancer; Sandu-Miclesco, whose figures reached

[1] Bidault: Du lupus compliqué de l'épithéliom. Thèse, Lille.
[2] Raymond: Annal. du dermatol., Bd. viii. Heft 3.
[3] Nithak: Beiträge z. Lehre vom Carcinom. Dissert., Marburg, 1887.
[4] Lubarsch: Ergebnisse der allgemein. Pathologischen morphologie und Physiologie, 1895, p. 466.

but 9 per cent.; Rapok, with thirty-nine tubercular in 399 cancerous; and others, who did not include tubercular lesions existing anywhere, were incorrect. He collected 569 cases of cancer, and investigating on this basis he found 117 tubercular—*i. e.*, 20.6 per cent. This makes his figures again look large; but he himself contradicts this by further stating that in his records there were 3.7 per cent. more tubercular who were non-cancerous than among those who were cancerous; and, on the other hand, 1.05 per cent. more cancerous among those who were not tubercular than among those showing lesions of tuberculosis. There is thus evidence that the two diatheses are unfavorable, each to the other, though the degree is slight and does not by any means amount to the original idea of Rokitansky of an antagonism. Lubarsch adduces figures and examples to prove that age is not the factor responsible for this, and suggests that more intimate study of the blood may make clearer the relations the diseases bear to each other. He makes a very lucid classification of their combinations, as follows:

Class I.—The tuberculosis is healed and the cancer has appeared subsequently. This is purely chance, and there is no actual relation.

Class II.—There are both old and recent tubercular lesions. Here the cancerous cachexia has probably produced a favorable soil for the tubercle-bacilli that have remained from the former struggle.

Class III.—To a cancer in active progress fresh tubercular lesions are added. This is but a rare and unimportant condition.

Class IV.—Cancer and tuberculosis proceed simultaneously. This is also very rare, and he considers the tuberculosis in such cases as predisposing to cancer by lessening the physiological resisting-powers.

Our case is difficult to place in this classification, however, and is excluded by the existence of the tuberculosis of the œsophagus in addition to his pulmonary lesions. The ancient tuberculosis, of course, played no active part in the etiology of the cancer; while the recent tubercular lesions almost certainly existed in part for many months previously to his death, while the carcinoma was of later origin. The pathological history would seem to be a local tuberculosis of the œsophagus, from the chronic irritation of which arose the cancer, and in this latter the added lowering of his resistance by the pulmonary tuberculosis lent its aid.

THE HYSTERICAL NEUROSES OF THE SKIN.

By Arthur Van Harlingen, M.D.,
of Philadelphia.

"It is important," says Charcot, "to realize that hysteria has its laws, its determinism, exactly the same as a nervous affection with a material lesion. Its anatomical lesion still escapes our methods of investigation, but it betrays itself in an undeniable manner to the attentive observer by trophic troubles analogous to those seen in the case of organic lesions of the central nervous system or of its peripheral nerves."

It is to some of these trophic troubles that I wish to call attention in the present paper.

The chief affections of the skin which have been described as occurring in the course of hysteria are the following: *erythema, dermatitis, urticaria* (including *dermographism*), *hyperidrosis, œdema, urticaria bullosum, pemphigus, herpes zoster, eczema, gangrene, pigmentation, vitiligo, lichen, chromidrosis, ecchymosis, hæmatidrosis.*

A brief description of some of the more salient characteristics of these affections is all that I shall give at the present time. I may say that, scanty as the descriptions may seem, they are based upon an extensive gleaning of the published literature of the subject, references to which are appended. My object is to give an extended view of the entire subject and of the relations of the various affections to one another, rather than to give a complete clinical picture of each one.

Erythema is one of the commoner forms of hysterical neurosis of the skin. It may form the origin or base of several other forms of eruption. The eruption of hysterical erythema presents in general nothing to distinguish it from the ordinary erythemata. In many cases, however, it tends to develop and change its character into that of a dermatitis, an urticaria, a purpura, or a gangrene. In a case reported by Schwimmer[1] the lesions of erythema occurring about the ankles became infiltrated with slight extravasations of blood, so that they resembled contusions.

In other cases a slight amount of effusion takes place, loosening the epidermis and causing the appearance of a flaccid bleb, or permitting the epidermis to be pushed or rubbed partly off the corium, leaving a highly characteristic abraded surface. This is the "neurotic excoriation" of Erasmus Wilson. In some cases the inflammatory character seems grafted on the original lesion either as the result of rubbing and scratching, or of the introduction of staphylococci.

As these cases show themselves, various secondary lesions are present, sometimes rendering the diagnosis difficult. Feigning is often suspected

[1] Die Neuropathischen Dermatosen, Wien, 1883, p. 94.

under these circumstances. A case reported by Dr. Stelwagon[1] some years ago was supposed to have been feigned. Here the patient displayed elongated crusted patches with slightly inflammatory borders coming out in successive crops. The discomfort caused by the eruption, or the morbid sensation preceding it, caused the patient to rub the skin and thus engraft a new process upon the original dermatoneurosis.

A careful comparison of such cases, where the eruption is supposed to be feigned, with others, where all possibility of deception has been excluded, will show identical symptoms in each instance, exception only being made as regards the subsequent irritation caused by applications consciously or unconsciously made.[2]

Urticaria is one of the more usual forms of eruption met with in the hysterical condition, and is, in fact, the first symptom of many of the other skin-lesions into which it develops. When simple and uncomplicated it does not differ greatly from ordinary urticaria in appearance. Sometimes a violent emotion, as anger, or a nervous shock, as in a railroad accident, may lead to an outbreak of the eruption. Similar outbreaks may, however, occur in persons of a neurotic temperament with a predisposition to hysteria, and may in many cases be hysterical in origin. Urticaria is the basis of some of the more severe forms of hysterical skin-disease, and we often find cases reported as "urticaria with bullous efflorescence," "urticaria hemorrhagica," and "urticaria gangrenosa." These forms will be described a little later.[3]

Closely allied to urticaria is the peculiar condition named by Barthelemy, in his admirable monograph upon the subject,[4] *Dermographism*, but also known as *autographism*, *factitious urticaria*, etc.

Dermographism is the property sometimes assumed by the skin of preserving, in an enlarged and more or less permanent form, any marks which may be made upon it. To produce such a lesion in the normal state intense and prolonged pressure, as of a tightened cord, is required, and even this produces a merely transitory and non-elevated mark. In the condition of dermographism simple contact with a smooth instrument or with the edge of the finger-nail produces an intense, persistent

[1] A Case of Feigned Eruption. Archives of Dermatology, 1882, vol. viii. p. 236.

[2] The following papers have been referred to in connection with hysterical erythema and dermatitis:

Bowen. Boston Medical and Surgical Journal, January 26, 1890.
Bronson. Journal of Cutaneous and Genito-urinary Diseases, June, 1890.
Edebohls. New York Journal of Gynecology and Obstetrics.
Flower. British Medical Journal, 1870, vol. i. p. 307.
Hyde. International Medical Magazine, June, 1892.
Martin. Des Troubles de l'appareil vaso-moteur dans l'hystérie. Thèse de Paris, 1876.
Bulkley. Archives of Dermatology, 1880, vol. vi. p. 257.
Edwards. Quelques faits de Suggestion. Le Progrès Méd., 1890, No. 25, p. 500.
Fortner. Lancet, August 25, 1883.

[3] A typical case is that of Thompson ("A Case of Factitious Urticaria." Lancet, 1893, vol. i. p. 924).

[4] Etude sur le Dermographisme. Paris, 1893. (Contains a very copious bibliography.)

elevation more or less discolored in rose or white. In hysteria dermographism and urticaria may coexist, but, although arising from a common cause, they are perfectly independent of one another.

As the eruption is indolent, its existence is usually discovered by chance. Occasionally it is caused by some violent shock or emotion, or as the result of a nervous crisis; at other times it may ensue without any appreciable cause. The lesions may make their appearance after pressure with the fingers or the clothes. Sometimes an accurate pattern of a piece of lace is seen traced upon the skin. The impression of heat or cold often brings out the eruption, as washing the hands in cold water, or going out into the open air. In this the analogy to urticaria is evident.

There are several degrees of intensity of the affection. The mildest form shows itself as follows:

At a point where the skin has been irritated a white stria instantly appears, succeeded almost immediately afterward by a broader stripe of a deep rose color, perfectly flat, and on a level with the skin. This coloration lasts, as a usual thing, five to ten seconds, or half a minute at the most. When a distinct pathological condition exists, however, it may last fifteen to twenty-five minutes, and then it pales gradually and irregularly until it disappears.

In this mildest form dermographism is familiar to all. We see it in cases of eczema, in persons subject to urticaria, and in all sorts of individuals who are suffering from alimentary autointoxications. It is in no way pathognomonic of hysteria.

The medium condition of dermographism is characterized by a more pronounced appearance. The rose-colored line is bordered on either side by two narrow white bands, which disappear before the central one. The latter in its turn disappears in sinuous lines pinked out at the border, so that a number of rose-colored islets take the place of the band.

Barthelemy says that in analyzing the lesion above described we find the white lateral bands corresponding to a constrictive spasm of the vasomotors which determines a local anæmia at this point. The rose-colored points result from a dilatation of the vasomotors and a stagnation of the blood; so that there are at first a spasm and contraction at the periphery of the lesion; then dilatation or paresis—or even paralysis—of the vasomotors at the centre. Then, when this sort of circulatory convulsion, a true vasomotor ataxia, has passed away, the normal course of the blood returns little by little, and the skin resumes its ordinary aspect.

The severe or intensive form of dermographism as artificially developed begins like the milder form, but at the end of about four or five minutes the lesion has developed until it resembles a white cord or goose-quill under the skin, or even an enlarged and indurated vein. At the

end of half an hour, an hour, or several hours, a gradual inverse evolution sets in, following the same course as in the milder cases. Even after the lesion has disappeared to the eye, leaving only a diffuse redness, it can be felt under the finger, and a slight rubbing will bring out a renewed tracing of the original mark.

The duration of the lesion varies from an hour or two to several days.

While dermographism is not necessarily hysterical in its origin any more than urticaria, yet the susceptibility to this eruption is one of the characteristics of that affection, and in those forms of hysteria which in former times were attributed to direct demoniacal influence dermographism plays an important part.

Hyperidrosis is one of the symptoms of hysteria which has been known longest. Sydenham notes it as regards nocturnal sweating. The hyperidrosis of hysteria may be general or partial. When partial it is frequently superposed on other hysterical symptoms, being limited, for example, to the side affected in hemianæsthesia. In a case noted by Martin[1] night-sweats were present; but while the paralyzed side, which was atrophied, secreted only slightly, the unaffected side was streaming with perspiration. Martin says that such observations show us a sudoral hypersecretion joining itself to disturbances of sensation and motility limited to one side. But we cannot establish a certain relationship between any particular symptom and the hypersecretion of sweat, because not only are the two classes of phenomena not necessarily related, but we find the hyperidrosis showing itself now on the hemianæsthetic side, and now on the healthy side, the hemianæsthetic side remaining quite dry.

Fabre[2] says that hysterical hyperidrosis is less marked in some cases during the summer than it is in the winter.[3]

Œdema is a very interesting symptom of hysteria. It has been described by Weir Mitchell,[4] Charcot,[5] and more recently by many others, and I shall not here dwell upon it at any length. It usually occurs in connection with other hysterical symptoms, as arthralgia, paralysis, or contraction. It is most commonly unilateral, although exceptions have been noted to this rule, and a generalized form has been described.

The appearance of the integument which may happen to be the seat of hysterical œdema varies. The color may be white, as in ordinary

[1] Des Troubles de l'appareil vaso-moteur dans l'hystérie. Thèse de Paris, 1876.

[2] L'hystérie viscérale. Paris, 1883, p. 96.

[3] See also Comby. Hystérie larvée, Sueurs profuses des extrémités. Journ. de Méd. et de Chir. Prat., 1881, p. 344.

Sorbets. Hystérie, Froid glaciale, Sueurs profuses. Gaz. des Hôp., 1889, t. 62, p. 945.

[4] The Unilateral Swelling of Hysterical Hemiplegia. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1884, vol. lxxxviii. p. 94.

[5] L'œdème bleu des hystériques. Clinique des Mal. du Syst. Nerveux, 1892, t. i. p. 95.

dropsies; rose colored, or red; but most frequently it is bluish or violaceous. The color usually remains the same in a given individual whatever point may be attacked and in successive attacks.

Hysterical œdema is always hard; the pressure of the finger makes little or no impression. Punctures do not give exit to serum. Gilles de la Tourette says that it is a regular œdema invading the entire circumference of the member. There are exceptions to this, however. In one case a tumor the size of an egg, of a violaceous rose color, was found seated near the external malleolus of the left leg. Such cases, excepting where the history is clear, are with difficulty distinguished from the cases of so-called giant urticaria and acute circumscribed cutaneous œdema.

On palpation the sensation given by hysterical œdema varies. The temperature of the surface may be normal, or in blue œdema it may be diminished, while in rose-colored or red œdema it may be increased. In one case of œdema of the wrist, hand, and fingers the surface was 10° to 12° C. less than on the affected side. In such marked cases the skin is cold and dry, the color blue with violaceous marblings, and it may become almost black in color.

Sometimes the general tint may be rose-colored or red, the surface shining as in articular rheumatism, and giving the impression of an elevation of temperature, which may indeed be present to the extent of 1° to 2° C.

Hysterical œdema, whatever form it may take, is almost always accompanied by sensory troubles, often to a marked degree. Charcot has observed thermoanæsthesia.

The course of hysterical œdema is variable. It appears with or preceding the contracture or paralysis, becomes established with the motor troubles, and undergoes frequent changes of increase and diminution. The latter is highly characteristic. The œdema increases or decreases under the influence of the appearance or disappearance of the menses, of strong emotion, etc.

The duration of the affection is very variable. It may last as long as two or even five years. Its gravity is measured by that of the accompanying general symptoms.

The diagnosis of hysterical œdema when this occurs in connection with other well-marked hysterical symptoms is usually not difficult. When the œdema is rose-colored and coexists with an arthralgia rheumatism is suggested. Brodie has noted, however, that the œdema is not exactly limited to the painful joint, but has a strong tendency to become diffused over the entire member and even in localities where the articulations are unaffected. In addition there is no fever in connection with the hysterical affection. Nevertheless, it has sometimes been taken for rheumatism.

In other cases hysterical œdema has been mistaken for phlegmasia alba

dolens, periostitis, syringomyelia, and Raynaud's disease. As regards the latter, similar symptoms sometimes occur in connection with hysteria.[1]

Pemphigus. This form of hysterical dermatoneurosis has long been recognized, and the term "pemphigus hystericus" is familiar. The eruption takes on various aspects. The lesions may consist of phlyctenulæ, or of larger blebs, and it may occur alone, the bullæ rising directly from the skin without any perceptible base or areola, or they may develop from erythematous or urticarial patches. Their most frequent seat is upon the limbs, although any portion of the body may be attacked.

The lesions may be filled with serum, with serosanguinolent fluid, or, in rare cases, they may be semipurulent or purulent. Commonly the individual lesions run a rapid course, but the eruption is kept up by repeated outbreaks. Not infrequently each outbreak is connected with an hysterical attack, or in women with the recurrence of the menstrual period.

The bullæ of hysterical pemphigus may dry up and leave crusts which fall off without being followed by any mark, a pigment-stain may be left behind, or an ulcer may form at the base of the lesion and, healing, leave a keloidal scar.[2]

Herpes zoster. I am not sure that herpes zoster should be included among the hysterical neuroses. These, as I shall point out, seem to belong to the class of vasomotor affections, while herpes zoster, according to Vulpian,[3] is not the result of direct vasomotor influence. Ferré,[4]

[1] See also Ashton, Thomas G. Angioneurotic Œdema. Philadelphia Med. News, 1893.
Börner. Ueber nervöse Hautschwellungen als Begleiterschinungen der Menstruation und des Klimax. Volkmann's Sämmlung, 1888, No. 312.
Collins. Angioneurotic Œdema. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1892, No. 104, p. 654.
Gilles de la Tourette et Dutil. Contrib. à l'étude des troubles trophiques dans l'hystérie. Atrophie Musculaire et Œdème. N. Iconog. de la Salpêtrière, 1889, vol. ii. p. 251.
McCosh. Hysterical Blue Œdema. Annals of Surgery, 1893, vol. xviii. p 667.
Shaw and Duryee. Hysterical Blue Œdema. Brooklyn Med. Journ., 1893, vol. viii. p. 193.
Simon. Acute Angioneurotic Œdema. Johns Hopkins Hospital Reports, August, 1891, No. 6, p. 339.
Thibierge. Un cas de l'œdème bleu hystérique. Bull. Soc Franç. de Dermatol. et de Syph., 1892, vol. iii. p. 135.

[2] See also Neuman. Wien. med. Jahrb., Monthly Abst., November, 1877, p. 506.
Brissaud. Eruption de pemphigus localisée a la moiété gauche du tronc chez une femme atteinte d'hémiplégia gauche (pemphigus zoster). Abeille Méd., 1879, vol. xxxvi. p. 473.
Susemehl. Deutsche Klinik, 1851, p. 87.
Mermer. Pemphigus dans les Neuroses. Thèse de Paris, 1877.
Pierrepont. Sajous' Ann. Univ. Med. Sci., 1889, vol. iv. a. 62.
Pick. Ueber ein eigenthumlich Nervöse Hautaffect. bei ein Hysterische Blötsinningen. Wiener med. Presse, 1880, Bd. xxi. p. 1830.
Neuberger. British Journal of Dermatology, February, 1893.
Murrell. Lancet, 1883, i. p. 447.
Kaposi. Pemphigus Neuroticus Hystericus. Wiener klin. Wochen., May 29, 1890.
Franceshi. Du Pemphigus chez les Hystérique. Thèse de Paris, 1883.
Duhring. Neurotraumatic Dermatitis Vesiculosum et Bullosum. International Medical Magazine. March, 1892.
Bondet Lyon Méd., January 1, 1893.
Bayet. Bruxelles Journ. de Méd., March 5, 1891.
Augagneur. La France Méd., May 24, 1887.

[3] Leçons sur les vaso-moteurs, t. ii. p. 556.

[4] Zona hystérique. Archives de Neurologie, 1882, vol. iii. p. 167.

however, gives the case of an hysterical patient in whom herpes zoster undoubtedly occurred. Pains in the *left* side of the chest resembling pleurodynia were treated by a blister, which was followed by the development of a zone of sensibility around it. A few days later lancinating pains were felt in the *right* lumbo-abdominal region, starting from the dorso-lumbar hysterogenetic zone and following obliquely the direction of the intercostal nerves toward the anterior aspect of the abdomen. Two or three days later still a well-marked eruption of herpes zoster was observed in the same locality.

In this case the herpes zoster developed on the course of nerves having their origin on a level with the dorso-lumbar hysterogenetic zone. It should be remarked that during the period of the zoster eruption the patient was free from hysterical attacks. The hysterogenetic zone, according to Ferris's view, seemed to determine the localization of the zoster, and this latter seemed to exercise a suspensive action on the convulsive manifestations of hysteria.

The case stands alone, so far as I know, as an instance of true herpes zoster occurring in connection with hysteria. The other cases reported, as Kaposi's,[1] lack some of the characteristics of true herpes zoster, and seem to be rather cases of diffuse gangrenous patches without any arrangement along the lines of the nerves.

Eczema. It is a question in my mind whether the lesions described as hysterical eczema should not rather be included under the head of dermatitis. The reports of these cases are usually too vague to permit of exact discrimination, but those which are not in their inception erythematous are probably of a similar character to the changes in the nails with which they are occasionally accompanied. The eczematous outbreak may be local, as in a case where the eruption was confined to the lobe of one ear, recurring with each hysterical outbreak for a year, or in another instance where the attacks occurred in the flexures of the joints, and were accompanied by trophic changes in the nails. Sometimes the eczema occurs upon a basis of urticaria. Nicholski has observed twelve cases of chronic eczema accompanied by cutaneous anæsthesia. The habitual location was the hand, and the eruption was usually symmetrical. In all these cases the eczema occurred in the anæsthetic region.[2]

Gangrene. The occurrence of gangrene in connection with hysteria is not, comparatively speaking, uncommon. It may occur in several different forms, and is usually preceded by certain subjective symptoms, as tingling, itching, or darting pain.

[1] Archiv. f. Derm. u. Syph., 1889, Heft iv.

[2] See also Fabre. Loc. cit.
Nicholski. Revue Neurologique, 1894, p. 628.
Oulmont and Touchard. La Médecine Moderne, February, 1891, Nos. 7, 8, 12, and 19.
Frèche. Eruptions cutanées chez les Hystériques (eczematous dermatitis). Journ. de Mal. Cut. et Syph., 1896, p. 4.

The earliest lesion is at times an erythematous blush, or a papule; at other times an urticarial wheal, and occasionally a bulla. On the basis of this preliminary lesion a point or patch of necrosis forms, sometimes as a black eschar, at other times as a parchment-like induration, accompanied in some cases with a slight purpuric effusion. The eschar separates, leaving an ulcer, which may be extremely superficial and followed on healing by only a slight pigmentation, or which may be deeper and followed by a keloidal scar.

Any of the other lesions of hysteria on the skin may develop into gangrene.

The so called "herpes gangrenosus" of hysteria has nothing herpetic about it, but is a simple multiple gangrene. The lesions of hysterical gangrene of the skin may be single or very numerous, and vary in size from a pin-head to that of the palm of the hand. Any portion of the body may be attacked.

Several cases have been reported where gangrene has occurred following injuries to the skin, as burns, pricking the fingers with needles, etc., so that the question as to whether a transmitted neuritis or some reflex effect might not be involved. Such, however, is not considered likely.[1]

[1] See also Allen. Journ. Cut. and Gen.-urin. Dis., June, 1890.

Arning. Münchener med. Wochen., 1888, No. 21. (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, October, 1888.)

Bayet. Gangrènes disseminés et successives de la peau d'origine hystérique. Journ. des Mal. Cut. et Syph., 2me sér. t. vi. p. 471.

Brodie. Works, vol. iii. p. 393.

Doutrelepont. Vierteljahrschr. f. Derm. u. Syph., 1886, p. 179. Monatshefte f. Prakt. Derm., 1890, Bd. ii. p. 219.

Ehrl. Gangrena cutis hysterica. Wien. klin. Wochen., 1894, p. 330.

Fagge. Purpura Gangrenosa. Guy's Hospital Reports, 1868, vol. xiii. 3d ser.

Fagge. Erythema Gangrenosum. British Medical Journal, 1870, i. p. 151.

Féré. Note sur le gangrène spontanée de la peau chez les hystériques. Comptes Rend. de la Soc. de Biol., 10 sér. i. p. 427.

Gaucher. Hemianæsthesia and Spontaneous Gangrene of the Fingers of the Same Side. La France Méd., July 31 and August 21, 1878.

Joseph. La Presse Méd. Belge. British Journal of Dermatology, May, 1893.

Kaposi. Zoster atypicus gangrenosus. Wiener med. Wochen., 1889, No. 10.

Loebel Senger-Hoch. Discussion on simulation in hysteria. Mercredi Méd., 1893, No. 49, p. 596.

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Petrie. Dermatitis gangrenosa. Berlin. klin. Woch., 1879, p. 509.

Quinquaud. Erythema gangrenosum. Ann. de Derm. et de Syph., 1983, t. iv. p. 254.

Renaut. Urticaire gangreneuse. La Méd. Moderne, February 20, 1890.

Riehl. Gangrena cutis hysterica. Wien. klin. Woch., 1893, p. 826.

Rooke. Lancet, 1864, vol. ii. p. 486.

Rostmann. Deutsches med. Woch., 1890, No. 23.

Schimmelbusch. Ein Fall von Selbstschädigung bei einen Hysterischen. Berlin. klin. Woch., 1872, No. 46.

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Strümpell. Ein Fall von Schwerer Selbstschädigung bei eine Hysterischen. Deutsche Zeitschr. f. Nervenheilkunde, 1892, No. 18.

Stockwell. Dermatitis Gangrenosa. British Medical Journal, February 12, 1870.

Verrillot. Nouv. Iconog. de la Salpêtrière, September, 1895, p. 288.

Veillon. Troubles trophiques symét. des Mains, etc., d'origin prob. hystérique. Nouv. Iconog. de Salpêtrière, July and August, 1892, p. 201.

Yandell. Gangrenous pemphigus. Louisville Medical News, 1879, vol. viii. p. 211.

Pigmentation, vitiligo. Parrot[1] has published a number of cases showing the relationship between certain nervous and neuralgic disturbances, and the appearance of pigment-spots. He intimates some connection between pigmentary derangements and chromidrosis. Lebrun,[2] in his thesis, describes seven cases of vitiligo which appear to have been connected with hysteria, the appearance of the vitiliginous patches coinciding in some cases with the attacks.

Fabre[3] says that the influence of hysteria in the production of pigmentary alterations is most manifest. He has frequently observed patches of pigmentation form upon the forehead and face in hysterical persons, similar in all respects to the mask of pregnant women, while the patients were neither pregnant, cachectic, nor suffering from uterine disease. In one case of hysteria Fabre observed a yellowish discoloration upon the right upper eyelid, a sort of xanthelasma. More frequently he has noted a blackish appearance over the skin, a variety of chromidrosis. This connection between chromidrosis and pigmentary alteration in the skin is a very curious one.[4]

Lichen planus. But few cases of lichen planus have been reported in connection with hysteria, and these are not altogether convincing as regards their true etiology. Feulard[5] describes one case which presented the typical features of lichen planus, with the peculiarity that the lesions were distributed along the course of the median nerve. A second case assumed the generalized miliary form. The palmar and plantar surfaces showed characteristic lesions, and others appeared on the buccal mucous membrane, the tongue, and the lower lip.

Hallopeau-Larat, cited by Gilles de la Tourette (*l. c.*, p. 431), described a case in which patches of vitiligo were surrounded by numerous papules of lichen planus.

Chromidrosis. Lecat[6] mentions the case of a woman in whom, as a consequence of some grief during pregnancy, an hysterical condition supervened. She became deeply pigmented all over the forehead, eyelids, and face, with hyperæsthesia of the affected parts. This condition was followed by black chromidrosis, disappearing at the end of term, but recurring during each succeeding pregnancy.

Billard[7] gives the case of a girl of sixteen, of nervous constitution,

[1] Notes sur quelques pigmentations anomales de la peau. Gaz. Hebdomadaire, Fév. 1869, p. 116.

[2] Du Vitiligo d'origin nerveuse. Thèse de Lille, 1886.

[3] L'Hystérie viscérale. Op. cit., p. 95.

[4] See also Barbe. Hystérie et vitiligo a la suite d'un opération de Battey. Ann de Derm. et de Syph., 1894, p. 457.

Hallopeau-Larat. Nouveau variété de tropho-neuroso characterisée par des dischromies et érup. lichenoid. Cited by Gilles de la Tourette. Traité de l'hystérie, ii. Part, t. i. p. 431.

[5] Lichen plan chez les hystériques. Ann. de Dermatol. et de Syph., 1890, p. 872.

[6] Traité de la couleur de la peau humaine. Amsterdam, 1765, p. 136.

[7] Mémoire sur un cas particulier de cyanopathie cutanée ou coloration bleu de la peau, causée par une altération de la transpiration. Archiv. Gén. de Méd , 1831, t. xxvi. p. 453.

subject to a dry cough, with occasional hæmoptysis and hæmatemesis, and on one occasion a "neurosis" for six days, but without any physical signs of disease. The patient displayed on the face, the neck, and the upper part of the chest a bright blue color, which on examination was found to be the product of the sweat-glands. The coloration, which afterward spread over the front of the chest and abdomen, and later over the shoulders, arms, and part of the thighs, varied considerably in intensity at one time and another, depending on the circulation of the part. When suddenly addressed the girl's face became of a deeper tint. "She blushed blue instead of red," as Billard says. She perspired profusely at night.

Hysterical chromidrosis is usually black or blue. The symptoms are as follows:[1] without an appreciable cause, or more frequently under the influence of some menstrual disturbance, moral emotion, or intense heat, the lower eyelids, more frequently attacked than other regions, become swollen, congested, and painful, while a blackish or bluish patch of variable area shows itself, which at first is rather light in tint, but soon becomes darker, and spreads over the entire surface of the lid. In some cases the affection goes no further, but in many instances the cheeks and forehead, particularly the edge of the scalp, the nostrils, lips, ears, etc., may be invaded, and occasionally, as in Billard's case, described above, a considerable part of the surface may be invaded.

The appearances presented by the patches of disease are variously described. Sometimes the skin looks as if fine charcoal-powder had been dusted over it. In other cases, particularly when the attack is a mild one, I have observed an appearance of fine black points, looking like comedones, or as if a greasy skin had been subjected to the dust of railroad travel. Sometimes black lines are seen in the folds of the skin, as of the eyelids. Occasionally the skin looks as if it had been smeared with a mixture of grease and lampblack, and occasionally such has been the fact, for certainly some few cases of black chromidrosis have been artificially produced. I believe, however, that in such instances there has been a slight spontaneous condition of chromidrosis to act as an autosuggestion to the patient.

I have not space at present to do more than sketch the appearances presented in this very interesting cutaneous manifestation of hysteria. I have endeavored in another place[2] to describe the affection at greater length.[3]

Purpura. Ecchymosis. Hysterical ecchymoses are usually found in connection with purpura and hæmatidrosis. They may occur separately,

[1] Parrot. Article Chromidrose. Dictionnaire des Sci. Méd.
[2] Art. Chromidrosis. Twentieth Century Practice of Medicine, 1896, vol. v. p. 539.
[3] See also Le Roy de Méricourt. Annales d'oculistique, 1863, t. l. p. 5.
Deltil. Hysterical Chromidrosis. La France Méd., 1877, p. 186.
Fox, T. C. British Medical Journal, 1881, vol. i. p. 921.

however, and are probably far more common than the number of reported cases would seem to indicate. In Magnus Huss's well-known case of hæmatidrosis the patient after an hysterical attack, accompanied by hæmatemesis, showed ecchymoses and suggillations of greater or less size over the left side of the body, and particularly about the left shoulder. After the attacks the left arm and leg remained in a state of semi-paralysis. Between the attacks the patient suffered occasionally from left intercostal neuralgia.

A case of ecchymosis by suggestion is that reported by Brown-Séquard,[1] where a mother, seeing a window-frame fall suddenly upon her child, showed immediately afterward a large ecchymosis upon the corresponding part of her arm.

Of purpura, in the narrower sense, the case reported by Rendu[2] will serve as an example. It was that of a nervous young woman in whom, following a moral shock, an eruption of purpura showed itself chiefly upon the thighs and arms. Each patch of purpura was situated upon a large papular elevation somewhat resembling urticaria. There were also marked areas of local œdema accompanied by a feeling of tension and pain, and sometimes forming very suddenly at different points. There was also a constant hyperæsthesia with sensations of cold.

Pincetta[3] reports the case of a girl of eighteen, who had suffered for a year previously with attacks of hysterical convulsions. One morning, on rising, she presented a bluish-red coloration extending over the pinna of both ears, with slight tumefaction, occurring without appreciable cause, and without other premonitory symptoms than a slight sensation of heat lasting a few hours. The discoloration was accompanied by desquamation, and disappeared in about eight days.

Gilles de la Tourette[4] records the case of a girl of nineteen years, of strong hysterical antecedents, who called his attention one morning to a small red patch on the internal tibial surface of the right side. On the previous evening she had had a weeping-spell, and during that night had experienced terrifying dreams. Toward morning she had felt a sharp pain on the internal surface of the right leg, and was much surprised on rising to discover, at the painful point, an ecchymosis 5 cm. in length by 3 cm. in breadth, oval, and with the long diameter vertical.

On examination right hemianæsthesia was found to exist in the region involved by the ecchymosis. The lesion passed through the usual changes observed in similar cases, and at the end of some days had disappeared. The patient was certain that she had not received any injury

[1] Soc. de Biologie de Paris, 1885, 4 Juillet.

[2] Recherches sur les altérations de la sensibilite dans les affections de la peau. Annales de Derm. et de Syph., 1874-'75, t. vi. p. 138.

[3] Ann. de Derm. et de Syph., 1896, p. 419 (from Riforma Medica).

[4] Nouv. Iconographie de la Salpêtrière, 1890, vol. iii. p. 49.

at the spot, and that it had been perfectly normal when she went to bed the night before; nor had she had convulsions through the night.

Hæmatidrosis. Hæmatidrosis, or bloody sweat, is one of the most striking manifestations of hysterical dermatoneurosis. Since the appearance of Parrot's monograph[1] this affection has been regarded as a neuropathic hemorrhage, and the cases which have been published from time to time when collated are found to be strictly dependent upon the hysterical condition.

I have elsewhere[2] given a full account of this affection, and shall, therefore, at present only touch upon its salient characteristics.

In some cases the exit of blood takes place from an apparently perfectly normal skin, but this is unusual. More commonly an erythematous patch, sometimes compared to a superficial burn, makes its appearance; the epidermis becomes raised as if a blister was forming, sometimes serous at first, in other cases bloody from the beginning. The blister breaks open and serum, pure or mixed with blood, flows at first, soon changing to pure blood. Sometimes the loosened epidermis seems to float off from the subjacent corium, leaving a raw, oozing surface covered with a dew of blood. Where the epidermis is thick, as on the palms or soles, a fissure opens from which the bleeding proceeds. When the blood oozes from the apparently normal skin it soon dries, and can be wiped away, leaving a normal or slightly pale surface beneath. When a bulla has formed the process is more severe. After the bleeding has ceased, which may occur at the end of a few hours, or only after a day or so, the crust usually dries up and undergoes involution as an ordinary blister, healing completely at the end of six to ten days. Sometimes the surface shows no trace of the lesion; at other times a pink tender spot, or a fissure if the epidermis is thick, remains. The latter is especially the case in the numerous recorded instances in which the wounds of the Crucifixion are imitated, the recurrences taking place in the hands, feet, side, and brow, week after week with perfect regularity. Now and then suppuration may take place, which delays the healing, but this is rare and accidental.

The general symptoms vary greatly, but are almost always of a highly hysterical character. Accesses of fury, attacks of lethargy, ecstasy, and the like usually precede the outbreak. Burning, stinging, and darting pains at the point to be attacked usually precede the appearance of the lesions.

Although in some cases a very considerable amount of blood may be lost, yet the patient usually enjoys fair health, or at least does not suffer from the loss of blood.

[1] Etude sur la sueur de Sang. et les Hemorrhagies Neuropathiques. Paris, 1859.
[2] Hæmatidrosis (bloody sweat). International Clinics, July, 1896, vol. ii. 6th ser.

Few of the hysterical dermatoneuroses present such a variety of appearances as hæmatidrosis. I have given an outline of the chief aspects presented, and the picture must be filled in by a perusal of the histories of individual cases. Many of these will be found by reference to the bibliography appended.[1]

There are other forms of cutaneous disease which have been described

[1] Andrews. Purpura Occurring in Nervous Diseases. Buffalo Medical and Surgical Journal, January, 1878, p. 401.

Caldwell. Michigan Medical News, 1879, p. 249.

Cooper. (Cited by Laycock. Nervous Diseases of Women, p. 234.)

Couty. Purpura of Nervous Origin. Gaz. Hebdom., 1876, Nos. 36, 38, 39, and 40.

Weir Mitchell. On Certain Forms of Neuralgia Accompanied with Muscular Spasms and Extravasation of Blood, etc. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, July, 1869.

Tyrell. Neurotic Purpura. Pacific Medical and Surgical Journal, June, 1876.

Anderson. Journal of Cutaneous Medicine, 1867, vol. i. p. 328.

Böens. Louise Lateau. Bruxelles, 1875.

Böens. Fin de la Comédie de Bois d'Haine. Paris, 1876.

Bourru et Burot. Hemorrhagie de la peau provoquée par la suggestion en somnambulism. Comptes Rend. de la Soc. de Biologie, 1885, 8th sér. t. ii. p. 401.

Caizergues. Cited by Gilles de la Tourette. L'Hystérie, 2me Part, t. i. p. 445.

Chambers. Clinical Lecture on a Case of Bloody Sweat. The Lancet, 1861, p. 207.

Chauffard. Hæmatopedesis. Archives Gén. de Méd., 1830, p. 572.

Chevallereau. Louise Lateau. Médecine Pratique.

Crocq. Louise Lateau devant la Physiologie et la Pathologie. Bruxelles, 1875.

Dauvergne. Annales de Derm. et de Syph., 1876–'77, t. viii. p. 121.

Dutil. Traité de Médecine, t. vi. p. 1380.

Ferroud. Note sur une Stigmatisée. Bull. Méd., 1890, p. 312.

Froidefond. Contribution à l'étude de quelques hemorrhagies neuropathiques. Thèse de Paris, 1879.

Gilles de la Tourette. Considérations sur les ecchymoses spontanées et sur l'état mental des hystériques. Nouv. Iconog. de la Salpêtrière, 1890, vol. iii. p. 49.

Hellier. A Case of Hæmatidrosis (sweating of blood). Indian Medical Record, Calcutta, 1893, p. 151.

Huss. Archives Gén. de Méd., 1857, 5th sér., t. x. pp. 1–129.

Hutchins. International Clinics, 1893.

Imbert-Gourbeyre. Bull. de l'académie, 1879, 3d sér., t. ix. p. 265.

Immermann. Hæmophilia. Ziemssen's Cyclopædia, vol. xvi.

Krishaber. Multiple Hemorrhages of the Tongue and Skin at the Menopause. Ann. des Mal. de l'Orielle, 1877, t. iii. p. 38.

Labée. Le Mouvement Méd., September 5, 1877, p. 411.

Lefebre. Louise Lateau, 2d edition. Louvain, 1873.

Mabille. Note sur les hemorrhagies cutanées par autosuggestion dans le Sommeil provoquée. Progrès Médical, 1885, p. 155.

Mangon. De l'Hæmatidrose. Thèse de Bordeaux, 1889.

Maury. Les Mystiques Extatiques et les Stigmatisées. Annales Médico-Psychologiques. Paris, 1885, t. i. pp. 218, 219.

Mesnet. Autographism et Stigmata. Bull. Acad. de Méd. de Paris, 1890, 2d sér., t. xxiii. p. 362.

Mora. Des hemorrhagies dans l'hystérie. Thèse de Paris, 1880.

Raymond. Ecchymoses et éruptions pemphigoïdes de nature hystérique. Journ. des Mal. Cut. et Syph., 1891, p. 462.

Szigmondy. Lancet, 1878, vol. i. p. 593.

Titel. Ein fall von Hæmatidrosis. Arch. f. Heilk., 1876, p. 63.

Van Harlingen. Hæmatidrosis (bloody sweat). Internat. Clinics, 1896, vol. ii. p. 332.

Warlomont. Louise Lateau (Rapport Médical). Bruxelles, 1875.

Warlomont. Louise Lateau (Réponse). Bruxelles, 1875.

Coomes. Philadelphia Daily Item, December 11, 1891.

—— La Stigmatisée de Bahia. Archives of Dermatology, 1876–'77, vol. iii. p. 261.

—— An Italian Louise Lateau. Lancet, 1876, vol. i. p. 557.

as occurring in connection with hysteria. These are *erythromelalgia, Raynaud's disease, ichthyosis, epithelial atrophy with rupia-like exudation of scales, phlegmonous swellings, pseudo elephantiasis, Morvan's disease, nodules, ulcers,* etc.

In addition certain trophic disorders of the appendages of the skin have been noted: *canities, alopecia, hypertrichosis, fissure of the hair,* together with *deformities* and *shedding of the nails.*

If now we set aide the last two groups and consider the forms of disease which I have sketched in outline, we find that they belong one and all to a certain category. They are not merely a fortuitous collection of skin diseases, but belong to a series of which the first member is erythema or dermatographism. A step further we find urticaria with œdema. Then, as another stage in the series, we have the vesicular and bullar formations, and, finally, gangrene. Side by side with these we have alterations in the pigmentary deposit of the skin, hyperidrosis, chromidrosis, and hæmatidrosis. I have described these affections separately; but the fact is that in many cases as reported several of these affections run one into another, beginning with one of the earlier members of the series and developing later into a more advanced manifestation. They all, however, belong to one and the same group—the vasomotor neuroses.

As regards the other forms of hysterical dermatoneuroses, erythromelalgia, Raynaud's disease, pseudo-elephantiasis, etc., these evidently belong to the same general category, or at least the vasomotor element is evident in them. The changes in the hair and nails cannot in the present state of our knowledge be brought under precisely the same head, but this, I think, is because we know so little about their true pathology.

It is a curious coincidence, and one which I think will go toward helping us in our future study of the dermatoneuroses in general, that the skin-lesions accompanying other affections of the nervous system are similar in their nature to those we have described above.

Thus Crocker[1] states that the eruptions which have been noticed in ataxy are: 1. Transitory erythema (*a*, simple; *b*, nodosum). 2. Urticaria. 3. Papular or lichenoid eruptions, probably eczematous. 4. Ordinary eczema. 5. Herpes zoster. 6. Pemphigus. 7. Pustules "like ecthyma." 8. Ulcers. 9. Superficial gangrene. 10. Perforating ulcer of the foot. 11. Falling off of the big toe-nail. 12. Leucoderma. 13. Petechiæ and Ecchymoses. 14. Unilateral sweating. 15. Œdema.

Cutaneous disease from lesions of the branch or branches of nerves below the ganglion have been described by Paget and by Mitchell, Morehouse, and Keen. The nutritive and other defects that have been

[1] Lesions of the Nervous System Etiologically Related to Cutaneous Diseases. Brain, 1884, p. 349.

recorded are, according to Crocker: 1. Erythema. 2. Herpes. 3. Bullæ. 4. Ulcers. 5. Eczema. 6. Glossy skin. 7. Defects of nails. 8. Defects of hair. 9. Defects of pigment. 10. Chronic œdema, like elephantiasis. 11. Ichthyosis-like condition.

The fact that the dermatoneuroses resulting from organic disease so closely resemble in their nature those occurring in hysteria is of importance when we come to consider the question of the supposed factitious character of some of the hysterical eruptions.

Until within the last few years most of the hysterical dermatoneuroses were considered as belonging to the category of feigned diseases. The desire for sympathy, the morbid longing for notoriety, etc., were supposed to account for the artificial production of lesions in cases where this could be proved, and the same deduction was drawn in many cases where the self-infliction of skin-lesions could not be proved to have taken place.

We know now that the phenomenon of autosuggestion is one of those most conspicuous in the etiology of hysterical affections of all kinds, and we have sufficient data to assume autosuggestion to be at the bottom of the production of many of the dermatoneuroses of hysteria. Particularly in the numerous and carefully detailed histories of the stigmatics we can trace the working of autosuggestion most plainly.

Moreover, several most interesting experiments in suggestion have been successfully performed. Mabille suggested to an hysterical man, plunged in hypnotic slumber, that a quarter of an hour after he should awake the letter V would appear at a spot upon his forearm, which he marked with a pencil, and that this letter would bleed. The phenomenon promptly appeared at the time and in the place suggested. Patches of dermatitis resembling burns and other skin-lesions have also been induced by Edwards and others through suggestion.

As a result of such experiments and of more careful observations the conviction has grown that feigning in the ordinary sense of the word has no place in the production of the hysterical dermatoneuroses, and that the term "hysterical feigned diseases" of the skin is a misnomer.

Barthelemy, in his exhaustive treatise on *Dermographism*, shows that in numerous instances the appearances presented by dermographism are produced by autointoxication of some sort. The close analogy between this condition and that of ordinary *erythema ab ingestis*, or of common urticaria, as regards their pathological anatomy and mode of production, seems to indicate that intoxication or autointoxication of some sort is the cause of their production in each case. Barthelemy proposes to employ the term "dermatoneurose toxivasomotrice" as a secondary appellation of dermographism.

Whether autointoxication or intoxication, as by lead-poisoning, etc., may or may not account for the production of hysterical symptoms of other kinds, I am not prepared to express an opinion. I am inclined to

believe, however, that such causes may have influence in the production of some of the skin-manifestations of hysteria. To go further into this subject would, however, lead me too far from the original object of this paper, which has been to group together and display the hysterical neuroses of the skin so far as our present knowledge of these affections will permit, and to claim for them a place in our nosology.[1]

A CLINICAL STUDY OF THE OPHTHALMIC SYMPTOMS SEEN IN A CASE OF FRACTURE OF THE ANTERIOR BASE OF THE SKULL.[2]

By Charles A. Oliver, A.M., M.D.,

one of the attending surgeons to the Wills Eye Hospital; one of the ophthalmic surgeons to the Philadelphia and Presbyterian Hospitals.

On February 6, 1894, W. H. G., a thirty-eight years old brakeman, came to my ophthalmic clinic at the Presbyterian Hospital in Philadelphia. He stated that on December 15, 1893, while attempting to place a coupling-pin in position between a lumber and a large freight car he involuntarily raised his head, when instantly it was caught and squeezed between the high, projecting platform of the large

[1] The forms of disease referred to in the following notes have not been described at length in the present paper. I hope to have an opportunity to refer to them in a future communication.

Fournier. Hystéro-neurasthenie secondaire Algidités périphériques intenses; ébauche de Maladie de Raynaud, etc. Bull. Soc. Franc. de Derm. et de Syph., 1893, vol. iv. p. 314.

Rosenthal. Die vasomotorischen Innervation-Störungen bei hysterie (pseudo Raynaud's disease). Wien. med. Presse, 1879, p. 802.

Levy. Maladie de Raynaud et érythromélalgie d'origin hystérique. Soc. de Biol., October 20, 1874.

Lannois. Paralysie vaso-motrice des extrémités ou érythromélalgie. Thèse de Paris, 1880, p. 11.

Weir Mitchell. Hysterical Rapid Respiration, with Cases (epithelial hypertrophy). American Journal of the Medical Sciences, March, 1893.

Trelat et Castex. Phlegmonous swelling and ulcers. La France Méd., 1877, t. ii. p. 673.

Souques et Gasne. Un cas d'hypertrophie des pieds et des Mains avec troubles vaso-moteur, des extrémités chez une hystérique. Nouv. Iconog de Salpêtrière, 1892, p. 281.

Thibierge. Un cas de pseudo-éléphantiasis neuropathique du membre supérieure chez une femme hystérique. Bull. et Mém. Soc. Méd. des Hôp de Paris, 3e sér., t. xi. p. 202.

Ducamp. Hystérie et Maladie de Morvan. Gaz. Méd. de Nantes, 1890, t. ix. p. 1.

Jaeger. Nodules and Ulcers. Ann. de Derm. et de Syph., 1888, p. 560.

Marcamo. Ulcers. Le Progrès Méd., 1878, p. 514.

Ferré. Note sur un trouble trophique des cheveux survenant à la suite des attaques chez les hystériques. Comptes Rendus de la Soc. de Biol., 1885, p. 594.

Neisser. Ueber ein merkwürdige Haarausfal bei einen Hysterischen. Schles. Gesellsch. f. Vaterl. Kult. Breslau, 1888, lxv. p. 57.

Ladame. Alopecia. Revue Neurologique, 1896, No. 1, p 2.

Tronchet. Panaris symétrique superficiels chez une hystérique. Bull. Soc. de Méd. et de Chir. de Rochelle, 1891, p. 64.

Falcone. Ueber spontanes Abfall der Nagein bei einen Hysterischen. Deutsche med. Wochen., 1886, vol. xii. p. 717.

[2] Patient exhibited before the Section on Ophthalmology of the College of Physicians of Philadelphia, and paper read before the Medical Association of the Baltimore and Ohio Railway Surgeons.

car and a pile of lumber that had been improperly laden beyond the "dead-line" of the smaller car. He immediately became unconscious, fell free of the tracks, and was carried to the Hospital of the Protestant Episcopal Church by some fellow-workmen.

Bringing a certificate from Dr. Walter R. Lincoln, who was one of the resident surgeons, that he was admitted to the institution on December 15, 1893, and that his injuries consisted in "contused wounds of the scalp, concussion of the brain, and fracture at the base of the skull," induced me to address a letter to Dr. Lincoln, asking him, if agreeable and convenient, to obtain, if possible, a brief history of the condition of the case when it was first seen. In response, the accompanying very interesting and excellent account was received:

"I received your letter of inquiry, and I am very sorry that I have no notes except name, etc., at hand concerning the case, and hence will have to call upon my memory. You can secure a copy of the notes of the case by writing to Dr. Henry Doan, at the Episcopal Hospital.

"I was resident in charge of the case, and, of course, remember it well. W. H. G., aged thirty-eight years, married, was admitted to the Protestant Episcopal Hospital, December 15, 1893. The case was admitted during my absence. His head was caught between a heavy timber and a freight car, the force producing the injury being applied, as nearly as I could make out, about one-half inch above the tip of both the auricles, and acting in directly opposite directions. He had at these places on the head two scalp-wounds, which were examined closely at the time by my substitute, Dr. Samuel C. Falls. Dr. Falls could not find any evidence of fracture at these points. When I returned late at night I found the patient's wounds dressed and the patient, as I remember, in the second stage of cerebral concussion; somnolent, but easily aroused, and very irritable when disturbed in any way. He was placed at once on restricted milk-diet and on a course of calomel, his bowels being first freely purged by Epsom salt. The calomel was continued, I think, about two weeks, possibly longer, but not to the point of salivation, although the bowels were kept freely moving, possibly about two or three times in twenty-four hours.

"The morning after admission the patient called my attention to his seeing 'everything double;' I then examined him more carefully and found his right external rectus muscle paralyzed and that he had a convergent squint. He was unable to close the eyelids of the right eye. The right pupil was, I think, contracted. At any rate, the pupils were markedly unequal. There was paralysis of the right facial nerve and there was no sensory paralysis.

"The temperature, while it was persistently fluctuating, was never, as I remember it, over 101°, and for the first two weeks I do not think that it was lower than normal. From the right ear small quantities of bloody fluid (not tested) kept discharging for possibly a week after admission. The patient said that when the injury was received he bled from the eyes(?), ears, and nose. His eyes and eyegrounds were examined by Dr. Albert G. Heyl, who, if I remember rightly, found a distinct, abnormal tortuosity of the vessels and an engorgement of the veins of the eyegrounds. The patient was rendered quite deaf in both ears; in one more than the other. There was a slight amount of subconjunctival hemorrhage in the right eye.

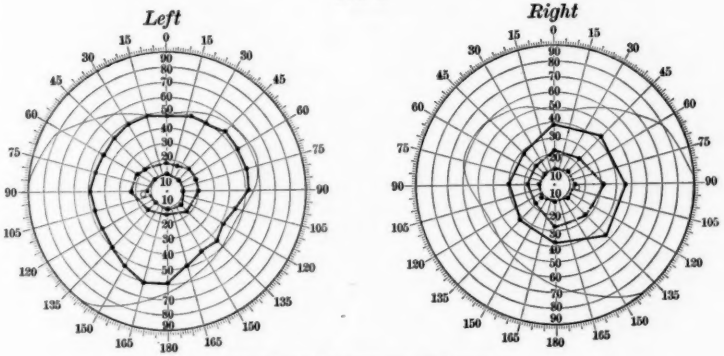
"After the calomel was stopped the patient was placed upon iodide

of potassium, I think fifteen grains daily, and kept upon this until he was discharged from the hospital on January 17, 1894."

A letter from Dr. Doan a few days later confirmed the statements of Dr. Lincoln and brought the following additional notes: that on the fourteenth day after the accident "deafness was disappearing, but the paralysis of the right facial and external rectus still remained."

At the time of my first examination two irregular, linear scars could be seen on the forehead, running parallel to one another diagonally from the left upper temporal region to the right eyebrow. There were also some superficial cicatrices in the scalp immediately over and back of both ears. The right pupil, which was one millimetre smaller in size than its fellow, equalled two millimetres in its horizontal meridian. Both irides were equally, though feebly, responsive to light-stimulus, and still less so to accommodative efforts. Direct vision for form in each eye seemed unimpaired. Accommodative power was rather weak for age and refractive condition. The fields of vision for form, as shown

FIG. 1.



Visual fields for white, red, and green.

in the accompanying diagrams, were somewhat concentrically contracted, this being the more noticeable in the right eye. The color-fields for red and green, as can also be seen in the same diagrams, were very much diminished, especially in the left eye.

There was a paresis of the right levator palpebræ, producing a very slight ptosis, every effort of the muscle to raise the lid being associated with a pronounced compensatory movement upward of the eyeball, so that at the moment of extreme action the lower corneal border was two millimetres higher than that of the opposite eye. The lower fibres of the right orbicularis palpebrarum were paralytic, producing a pronounced lagophthalmus and stillicidium. The upper fibres of the same muscle were sufficiently paretic to fail to permit any more than two millimetres of downward movement of the lower border of the upper lid, thus preventing closure of the eye. On the left side there was an extremely slight lagophthalmus. The fibres of the corresponding orbicularis palpebrarum were manifestly though very slightly paretic, each attempt at closure of the lids, although resulting in an apparently good response,

being accompanied by a spasmodic twitching of the muscle, especially in its upper fibres. At the moment that the muscle was exerted to its utmost action the right eye turned up and out and the lower face was dragged to the left. The patient voluntarily stated that it was much easier to close his right eyelid when his mouth was open.

There were an absolute palsy of the right externus and a slight paresis of the left externus, the eyes deviating markedly inward, particularly the right one, when alternately covered from fixation upon some distant and near object situated on the median line. The patient constantly complained of a disturbing and distressing double vision for both far and near, this being made worse when he attempted to look at near objects. Prismatic tests showed that there was a pronounced homonymous diplopia, the false image at times being situated upon a higher level than the true one. In attempts at lateral deviation to the right the right eye gave a short twist up and out at the same time that the left eye turned markedly inward. In similar attempts to the left side the outward movement of the left globe was somewhat impeded and the eyeball rotated slightly upward.

The right superciliary border was drooped, there being almost total paralysis of the frontal fibres of the right occipitofrontalis. Both the horizontal and the vertical fissures of the brow and forehead were almost completely gone. The fibres of the right side of the corrugator supercilii were markedly paretic. The right face was almost mask-like. Not only were the muscles of the right epicranial and palpebral regions involved, but the muscles elevating the right side of the bridge of the nose, the elevator of the right angle of the nose, the dilators, compressors, and depressors of the right nostril were all affected, showing that the entire muscular grouping of the nasal region was included.

He could not whistle, smile upon the right side, depress the right corner of his mouth, or elevate or puff the right cheek, plainly evidencing that the nerve of impulse for movement in the three maxillary regions was gone.

A careful ophthalmoscopic examination showed upon both sides a typical venous stasis in the retinal circulation without any other evidence of intraocular disturbance. Both nerve-heads were plainly visible, and were devoid of any coarse pathological change.

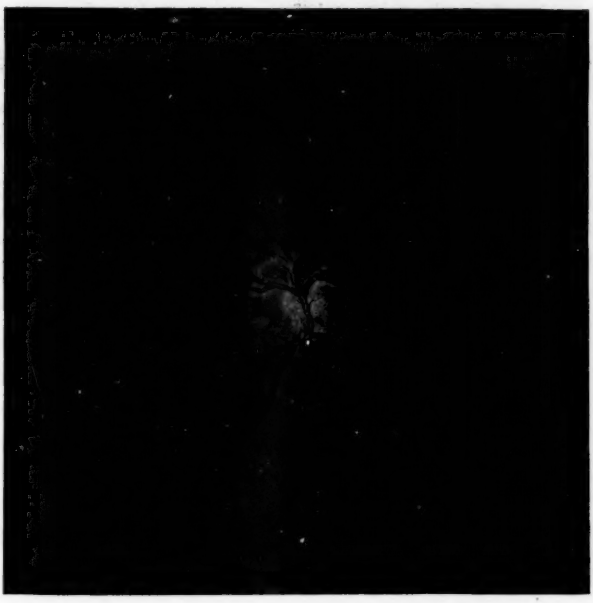
In order to make further study of the case I sent him to my friend and colleague, Dr. Arthur H. Cleveland, Surgeon-in-charge of the Ear, Nose, and Throat Dispensary at the hospital, with the request that he make an examination of the aural conditions. His report, received a few days later, read: "Watch not heard on contact on injured side. Large fork heard at four inches. Bone-conduction not good; Rinne's test. Both meatuses contain flaky collections of epithelium and blood. No pain. Right membrana tympani normal; the left membrana tympani very much congested over its entire upper area, and has a very small perforation in the upper posterior segment."

Some pain could be provoked by decided and repeated pressures over the lachrymal bones and in the regions of the antrum. There were no signs of caried teeth or bone-disease about either the right or the left face. He added that for some time after the accident he had had a peculiarity and hesitancy in speech and difficulty in deglutition, the right half of the tongue feeling rough and dry. Although no history of any form of relevant dyscrasia could be elicited from the patient,

or any recognizable signs found, yet he was placed under ascending doses of iodide of potassium, commencing with forty grains, well diluted, three times daily. He returned in about two weeks' time, at which visit (the second) I found that his ocular conditions were improved.

On March 2, 1894, through the courtesy and kindness of Dr. S. Weir Mitchell, he was carefully examined at Dr. Mitchell's clinical service at the Infirmary for Nervous Diseases. In addition to the above findings it was noted that he had nigritia linguæ and that the teeth were stained black. The tongue was protruded in the median line. The right side of the face felt a little firmer and denser than the left side, this perhaps being the result of traction of the muscles of the left side. The pupils

FIG. 2.



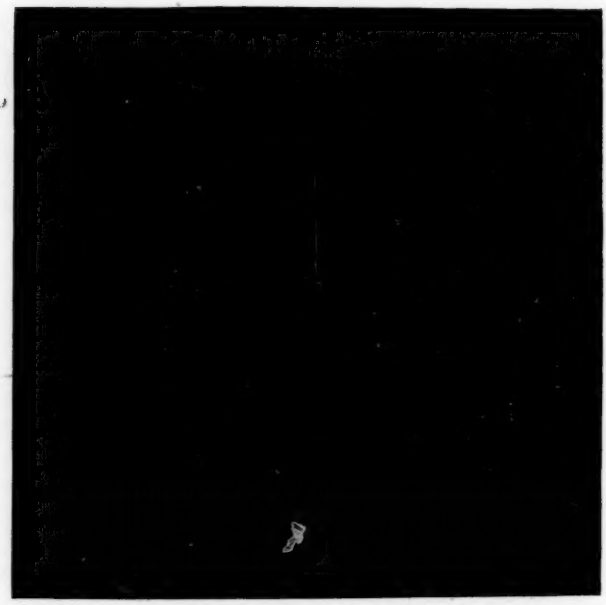
Ophthalmoscopic appearance in right eyeground.

were equal and regular and the irides were freely reactive to light, but doubtfully appreciable to accommodative efforts. Vision was markedly lessened in each eye, that of the right one being reduced to the ability to see to count fingers at one-third of a metre's distance. Tactile sensibility was impaired upon the right side of the face, and not lost. Faradic contractility was wanting and galvanic contractility was diminished. The patient stated that everything tasted "salty." He was unable to recognize the taste of sugar upon any part of the tongue. He asserted that he could taste salt when it was placed upon the anterior portion of the left side of the tongue. He was not able to recognize acetic acid. He said that tincture of nux vomica tasted sour when

a drop was placed upon the left side of the tongue. There was no palsy in the upper or lower extremities. Dynamometer: R., 115; L., 115. Station was a little unsteady. Knee-jerks were feeble, though reinforcible. The heart was rhythmic and the sounds were clear. At this examination it was noticed that the right upper lid could be closed with the finger, and that for a time it remained partially closed."[1]

I lost sight of the patient for four months, when, through the kindness of Dr. Conrad Berens, one of my colleagues at the Wills Eye Hospital, I was privileged to make my third examination.

FIG. 3.



Ophthalmoscopic appearance in left eyeground.

At this time there was a marked and radical change for the better. Uncorrected vision and accommodative power in each eye were normal for age and refractive condition. Ocular movements were good in all directions, there actually being the faintest indication of an exophoria for distance. The pupils were almost the same size, that of the left eye being still a trifle larger. The irides responded equally and freely to light-stimulus, accommodative impulses, and efforts for convergence.

The eyegrounds, which presented the same appearance as when I first saw them in the preceding February, were, as can be seen in the accom-

[1] I am under obligations to Dr. Frank Savary Pearce, one of the clinical assistants at Dr. Mitchell's clinic, for kindly transcribing these notes of the case from the records at the Infirmary.

panying reproductions, carefully and correctly sketched by Miss Margaretta Washington, of this city.

The patient stated that he had faithfully persisted in the tri-daily dose of iodide of potassium constantly since I had first ordered it. At this juncture the case was lost for clinical study.

The extended and detailed study of this case in the single examination of Drs. Mitchell and Cleveland, and the three examinations that I was enabled to obtain, is here given in full, as it offers much that is interesting and instructive.

As seen by the actual conditions during the examinations, there was an involvement of the right facial (the seventh) nerve as far back as internal to the chorda tympani and tympanic branch within the descending portion of the aquæductus Fallopii, the dryness and the impaired taste of the right side of the tongue distinctly supporting this belief.

The early history of not only hesitancy in speech, but peculiarity in character of speech-tone, associated with pronounced difficulty in deglutition, is expressive of temporary paresis of the palatal, glossal, and pharyngeal muscles. These symptoms must necessarily carry a portion of the lesion still further back along the seventh nerve; that is, to the origin of the greater, lesser, and external petrosal nerves near the hiatus Fallopii.

This argument of involvement of all of the branches of the right facial nerve is still further strengthened by the significance of the auditory symptoms. An analysis of these symptoms shows that the portio mollis of the seventh nerve must have been disturbed in a position that is internal to its vestibular and cochlear branches.

The slight disturbance to the corresponding nerve upon the opposite side must have been peripheral, as none of its branches of distribution that were above the temporo-facial nerve were involved, and it must have been isolated in the temporo-facial branch (especially in the malar twig), as the more peripherally placed cervico-facial branches escaped.

From the very beginning both of the second nerves showed symptoms of unequal and temporary pressure upon their tracts, this being the more pronounced with the right one. Gradually increasing until vision in each eye became greatly lowered, it decreased sufficiently to allow the recovery of normal acuity of vision in each organ.

The involvement of both third nerves, with the greater disturbance upon the right side, may, if the symptoms be carefully analyzed, be presumed to have been dependent upon intracranial lesion exerting its influence at or near the clinoid processes where the nerves pass along the outer wall of the cavernous sinus; this assumption being further borne out by the fact that the levator palpebræ is supplied by the superior division of the corresponding main nerve-trunk.

The fact that both sixth nerves were affected, producing right abducens palsy and left abducens paresis, is very important. As each basilar trunk passes forward and pierces the dura mater just beneath the posterior clinoid processes, it proceeds anteriorly through the cavernous sinus. In these positions the nerve-trunks approach the nearest to one another, so that any single disturbance in this vicinity would give identical lesions in the widely separated peripheral muscles which they supply.

The flow of blood from the right ear for a week, the want of symptomatic evidence of meningitis or cerebritis, and the persistent though eminently characteristic venous congestion of the retinal vessels, all in association with the other symptoms, clearly indicate fracture of the right temporal bone, with probable rupture of a neighboring sinus in the dura mater.

To emphasize the value of the ocular symptoms seen in this case, when studied in conjunction with one another and when examined in relation with the other symptomatic groupings, has been my excuse for offering this case for publication.

REVIEWS.

CLINICAL LESSONS ON NERVOUS DISEASES. By S. WEIR MITCHELL, M.D., LL.D. Philadelphia and New York: Lea Brothers & Co., 1897.

ANY book from the pen of S. Weir Mitchell is certain to attract attention. The little volume before us is an interesting account of "odds and ends" of neurological practice, related in Dr. Mitchell's happy style—a style that is marked by just enough eccentricities of expression to make it original and forceful. Even the gods are caught napping at times, and so we read on page 46: "Miss C., of Maine, aged forty years, *single*;" and on page 243, the expression "I am not at all secure that these inferences are safe," must be a slip, and so evidently is "lips" for "lids," on page 77. The subject-matter of the book is, however, of such great worth that if there were tenfold as many errors as there actually are they could not detract from the pleasure the reading of these pages affords. The greater the reader's neurological experience the more he will appreciate Mitchell's selection of subjects and the very unusual character of some of his observations. The book is full of such details as are not apt to be included in any of the ordinary text-books. We can refer only to a few of them:

In Chapter II. the author treats of recurrent melancholia and of some equally queer forms of periodical melancholia. The interest of these cases lies not in their great rarity, but rather in the comments which Mitchell sees fit to make. They are frequent enough to come under the observation of every neurologist. The reviewer has seen several that recurred regularly every autumn, while in Mitchell's cases the spring-time has been the favored period. The seasonal relation is, therefore, a little doubtful.

Disorders of sleep are discussed very thoroughly in Chapter IV. The cases of sleep-ptosis and of nocturnal paralysis are of especial interest. The patient with "unreasonable fears," mentioned on page 67, is a type of a large number of persons with imperative conceptions which are apt to be most annoying in the *prædormitium*, as Mitchell would say. Those of us who struggle almost continually with sleepless patients would have been glad to hear a word or two regarding the man "who does not sleep at all," and the entire absence of therapeutic suggestions is very noticeable in this chapter, as in a few others. "Respiratory failure in sleep" calls attention to a remarkable and alarming condition which occurs in spinal scleroses and other chronic disorders.

We must pass over a number of interesting chapters until we reach the tenth, in which erythromelalgia is fully described. This chapter alone makes the book worth having and reading. It will help to set aside doubts that have arisen in the minds of many regarding the differential diagnosis between this condition and Raynaud's disease; and

Dr. Taylor's beautiful plates are a great aid in attempting to distinguish between the two diseases. Mitchell can "hardly imagine anything clinically more strange than to consider the cases [of erythromelalgia and of Raynaud's disease] as one." Nowhere have we seen the differential diagnosis between the two diseases given as clearly as on page 179. We are willing to adopt the author's decision as to the vast difference between the two diseases, but confess that even after reading this chapter we had opportunity to see a case in which it was difficult to decide whether the patient was suffering from the one disease or the other. That both these conditions are often secondary to some constitutional malady we firmly believe. In the treatment of erythromelalgia the author favors stretching of the nerves in the first instance, and later on resection of their trunks.

Remarkable spinal anterior curvature with mental aberration we know from previous publications, but it seems that no one else has, up to the present time, observed any similar cases. That they constitute a special type of disease is hardly to be doubted.

Chapter XIII. has afforded us an immense deal of personal gratification, for it proves that recent authors who have had so much to say about reflex ocular neuroses do not deserve the credit of having originated the conception that headaches and other neuroses were in any way related to abnormalities of the ocular muscles. The idea was entertained by Dyer, Derby, and Mitchell as long ago as 1862; but Dr. Mitchell has not been able to see any positive results in the treatment of epileptics. We are entirely in sympathy with him when he says, on page 228, that he wishes he "could have seen some of the epileptic persons whom they [Stevens and Ranney] so successfully treated." Dr. Mitchell does not appear to know that nowadays "muscles are cut" for the relief, or cure, of spinal syphilis, and what not.

The chapters on Hysterical Contractures and on Certain Rotatory Movements in the Feeble-minded contain much that is of interest to every medical man, and well deserve a careful reading.

We would not end this review with the ordinary faint praise, but wish distinctly to say that we have found so much profit in studying this book that we hope Dr. Mitchell will continue his clinical lectures, and will publish a similar volume from year to year. With the exception of the few errors noted above, the typographical work is excellent, and the publishers are to be congratulated upon the general appearance of the volume.

B. S.

THE DISEASES OF THE STOMACH. By DR. C. A. EWALD. Translated and edited by Morris Manges, M.D. Second revised edition. New York: D. Appleton & Co., 1897.

SINCE the original work appeared in German, more than half a dozen years ago, it has passed through three German editions and has been translated into five foreign languages. The value of the work was at once recognized, and has increased with each edition. The last German edition of this work may be said to be the best text-book on these diseases in any language, and its value is enhanced by the careful and skilful editing of Dr. Manges. Although the German work may lose

some of its individuality by being added to by the translator, yet the latter has really increased its value by furnishing new material which has appeared since the last German edition, and has brought the work as nearly "up to date" as any book can be in these days, when publications are so numerous and so many experimenters are at work adding to our knowledge in all branches of medicine. For the general practitioner as well as for those who are specially interested in these diseases—we will not say "specialist," for we trust there are none such for this organ of the body—we can recommend no other work dealing with these maladies as of equal importance.

The views of Dr. Ewald are conservative, but he does not hesitate to express his own beliefs firmly on the many points which are still unsettled in reference to these affections. He does not hold some of the most advanced views of other workers in this branch, but his opinions will stand much careful investigation before being overthrown.

There are many points which we should like to discuss here at length, but as they are still undetermined we will only call brief attention to them to show what the latest ideas on the subject are. In discussing the proper method of washing out the stomach, p. 99, the author states that a large glass funnel should be used, for with this it is much easier to discover any foreign substances which may be drawn out from the stomach, and which are apt to be lost when a small funnel is used and the siphoned water is at once thrown away into a pail or jar. This is a small point, perhaps, but we know from personal observation that it is one to which ordinarily not sufficient attention is given.

Ewald points out that in palpating the stomach there are two structures in its neighborhood which may lead to confusion in some cases—one of these is the pancreas; it may be possible to palpate this organ where the abdominal walls are very thin and relaxed and where the stomach is depressed, but we cannot feel that mistakes would often occur by mistaking the pancreas for a tumor of the stomach. The other structure is a small lymphatic gland at about the middle of the greater curvature, in the gastro-colic ligament. He thinks that this may lead to even more confusion than the pancreas. We think that it is usually overlooked, and if discovered by a skilful diagnostician would not be apt to lead into error. We are surprised to note that almost nothing is said throughout the work of the great motility of the pylorus in certain cases where the stomach is much enlarged and depressed. In some of these cases the pylorus may be pulled far out from its normal position, and may be so mobile as to be pushed up or down, to the right or left, for several inches. In fact, we believe there is no other organ in the abdomen which, under given conditions, is so mobile; and it is a point of great importance in the diagnosis of a doubtful abdominal tumor.

On the question of faradization of the stomach we agree entirely with the stand taken by the author. Experimenters disagree materially on the value and results of electricity as applied to the stomach, and, in spite of a valuable contribution which lately appeared on this question in the *New York Medical Journal*, we cannot consider the points at issue settled. The editor has added several important paragraphs to this subject which admirably supplement the remarks of the author. In reference to the "deglutable stomach electrode," we might say from personal experience that it is a most unpleasant body to swallow, and

one we should hesitate to use or recommend frequently, notwithstanding the undoubted benefit which follows its use in some cases.

Of value both to the surgeon and physician in the operation of gastrostomy is Ewald's suggestion, p. 148, that the opening of the fistula in the stomach should be as close to the pylorus as possible, "so that with a soft rubber tube the food may be introduced directly into the duodenum, the pylorus serving, if possible, as a valve." This may be impossible where the pylorus itself is involved by a carcinomatous growth, but in other cases is undoubtedly the correct procedure.

In the diagnosis of carcinoma of the stomach we do not agree with Ewald's implication that it is easy to differentiate between this disease and essential anæmia. He says that the mistake of confounding the two affections occurs less often in Germany than elsewhere; "at least in English literature I have found the reports of quite a number of such cases in which a careful examination of the blood and of the stomach-contents ought to have prevented such errors." The differential diagnosis is, in a certain number of cases, of extreme difficulty, and we have seen one case in which no diagnosis was made, though studied with great care for several weeks, and up to the time of death; unfortunately, no autopsy was obtained. We feel also that more help can be derived from systematic examinations of the blood in doubtful cases of carcinoma of the stomach than Ewald appears ready to admit; and his paragraph on conditions of the blood in this disease seems to us insufficient.

The question of the cause of gastric ulcer still remains in doubt, and Ewald in a measure begs the question, in our opinion. He says that the alkalinity of the blood does not prevent the autodigestion of the gastric mucous membrane, but that gastric ulcer is due to "the disproportion between the acidity of the gastric juice and the composition of the blood;" and "as predisposing factors, however, we must recognize hyperacidity of the gastric juice, produced by hyperchlorhydria, as well as a change in the composition of the blood in the presence of the normal acidity." That autodigestion does not depend only on the alkalinity of the blood is undoubtedly true; but what the necessary composition of the blood must be to bring about in part the production of an ulcer we do not know, and the old theory of Pavy, that the blood kept the lower layers of the mucous membrane alkaline, and so prevented autodigestion of them, must, we think, still have some truth in it. And these relative relations of the gastric juice and the blood, on which Ewald based his theory, are almost as vague as Pavy's idea.

The site of gastric ulcer is, according to Ewald, "preferably at the pylorus and greater curvature." This conclusion he draws from his own experience and Nolte's statistics, drawn from a very small number of cases. But Welch's statistics, made up from nearly 800 cases, give 65 per cent. of the cases as occurring on the lesser curvature and posterior wall. These latter figures are given in a footnote by the editor, and we do not understand on what fair ground Ewald takes objection to these and those of Langenhans, which agree with them; he simply states that they are opposed to his own experience, which is not proof that they are not correct; and we believe they should take precedence over Ewald's figures.

We have not made these criticisms from any wish to disparage the work, but simply with a desire to show some points on which all students will not agree. We would like to prolong this review in order to bring

out many more points of interest and to show in what a masterly way they are dealt with. There is no other book which can take its place, and we feel confident that it will hold its own for many years to come.

The book as it comes from the press is well gotten up, though, like almost all our American text-books, too heavy to be easily handled. The German edition, which contains nearly as many pages, is much lighter, and though the paper is thin, not too thin to be agreeable. Misprints are not numerous, but we have noted a few. The editor has translated the book with success, and it is for this reason that we regret to see such an awkward sentence as occurs on p. 417, as follows: "If the cicatrix is circular and at about the middle of the stomach, forming the hour-glass stomach, or large, saccular dilatations may be formed, then it may happen that if for some reason lavage is performed later on, the remarkable phenomena may appear that the stomach apparently cannot be emptied."

The following quotation, with which it pleases us to close, might well have been adopted by Ewald as the motto for his own work. It cannot too often be impressed on the minds of students of this branch of medicine: "in fact, such terms as dyspepsia, indigestion, etc., are merely descriptive of a functional disturbance, but not of a distinct disease; and hence to-day we ought not to find a physician who considers a disturbance of digestion as a separate disease," p. 193. R. N.

PRACTICAL MANUAL OF DISEASES OF WOMEN, AND UTERINE THERAPEUTICS FOR STUDENTS AND PRACTITIONERS. By H. MACNAUGHTON JONES, M.D., M.Ch., Master of Obstetrics (Honoris Causa), Royal University of Ireland; Fellow of Royal Colleges of Surgery of Ireland and Edinburgh; formerly University Professor of Midwifery and Diseases of Women and Children, and Examiner in Midwifery and Diseases of Women and Children in the Royal University of Ireland. Seventh edition, revised and enlarged, with 565 illustrations. Pp. xxiv., 909. London: Ballière, Tindal & Cox, 1897.

THE reader who is familiar with the earlier editions of this work will not need the assurance in the preface that the present one shows evidence of most careful revision. Not only has the author recognized and corrected many of the faults which called forth some sharp criticism in the past, but his *Manual* has lost much of the local coloring which made it objectionable to American readers, and has become what he says he has tried to make it, "thoroughly cosmopolitan in character." Indeed, his brethren on this side of the water may well be gratified at the handsome recognition which he gives to their work—another proof of the power of science, and especially medical science, to overcome insular prejudice.

This is such a compact work that we find it difficult to choose separate sections deserving of especial approbation. The forty-nine chapters form a natural sequence, though the arrangement of subject-matter is different from that with which we are familiar. The introductory chapters on Anatomy and Examination are followed by two on Minor Gyneco-

logical Operations. Some of the statements in the section on Intrauterine Medication will hardly meet with general approval.

The Disorders of Menstruation are exhaustively treated in Chapters VI. to VIII., inclusive, an excellent feature being the thorough consideration of the use of drugs.

The chapters on Displacements (IX. to XIII.), including one hundred pages, show internal evidence of the author's familiarity with the work of foreign surgeons. We are sorry to see that he retains a number of antique pessaries (especially those for the supposed relief of anterior displacement) which we hoped had long been banished from text-books. Zwanck's abomination still appears, as well as a terrible instrument devised by Routh. Neither do we regard with approval the commendation of the old bloody operation for the relief of anteflexion. The description of the various operations for the repair of lacerated perineum appears under the head of "Prolapsus," a unique and by no means pleasing arrangement.

The chapter on Laceration of the Cervix is brief, and the description of the operation not any too clear, but on the whole the author's judgment of its value is quite fair.

Chapter XVII., on Peri- and Parametritis, is a little old-fashioned, especially the attempt to establish a sharp line of difference between the two affections. We are sorry to see a separate chapter on Pelvic Hemorrhage, which might lead the inexperienced to infer that it was a condition rather than a symptom. Uterine Fibroids are thoroughly discussed (pages 381–499), the various radical operations being well described and illustrated.

Separate chapters are devoted to Tuberculosis of the Uterus and to Deciduoma Malignum. Cancer of the uterus receives due attention, and the most recent operative technique is described.

Diseases of the Ovaries and Tubes are well handled in Chapters XXX. to XXXVII., inclusive, though the illustrations are timeworn. Due attention is paid to conservative operations on the adnexa, but we note with surprise the absence of any reference to the vaginal section for the removal of diseased ovaries and tubes. We would hardly regard the views of the American surgeon, quoted so largely on pages 615 to 617, as representing the present state of opinion of salpingo-oöphorectomy in this country.

Affections of the Bladder and Ureter are brought up to date, and there is also a chapter (XLIV.) on the Kidney, an innovation which we can hardly commend in view of the severe criticisms which have been heaped upon gynecologists for invading the territory of the general surgeon. The section of Diseases of the Rectum is more in place, and contains some useful hints on treatment.

Chapters on Sterility, Gynecological Electrotherapeutics, and Massage complete this excellent working-manual. We have endeavored to point out a few of its faults. Its virtues are not a few, chief among which are the condensation of a large amount of practical information in a short space without sacrifice of clearness, and the evident purpose of the author not to allow himself to be biased by local methods or opinions. More attention is paid to general and local medicinal treatment than is usual in modern text-books, with their strong surgical trend, and throughout the author writes from the standpoint of the general practitioner as well as from that of the specialist. H. C. C.

THE CELL IN DEVELOPMENT AND INHERITANCE. By EDMUND B. WILSON, Ph.D., Professor of Invertebrate Zoölogy, Columbia University. (Columbia University Biological Series, IV.) 8vo., pp. xvi., 371. New York: The Macmillan Company, 1896.

IN this day of rapid development of medicine along broad lines of scientific achievement it is particularly desirable that the physician should be in touch with the progress in all those cognate sciences which can in any way contribute to that development. As a student of disease he should be well grounded in all the essential facts of the phenomena of life, and should be in a measure their exponent in his community. For this reason it is a very agreeable duty to call the attention of our readers to the *Columbia University Biological Series*, edited by Professor Henry F. Osborn, the fourth volume of which has recently appeared and is the special subject of this review. An account of the progress of the idea of evolution "From the Greeks to Darwin," "Amphioxus and the Ancestry of the Vertebrates," "Fishes, Living and Fossil," are subjects which may well occupy the attention of the physician of an evening, and are sure to afford suggestions of biological relations which must prove of service in broadening his conception of disease. And while these works are scientific to the core, their contents are so presented as to make the hours spent in their perusal most enjoyable.

The Cell in Development and Inheritance is a most delightful book in every particular. It is only necessary to turn hastily the pages to become aware of the clear, sharply cut typography and of the wealth and beauty of the illustrations. No such collection of pictures representing the minuter structure of the cell in the various phases of its life-history has ever before been brought together. The bibliography is abundant, and is conveniently arranged for reference, a list of the more important works upon each topic being appended to each chapter, while a fuller bibliography is added at the end of the volume. A glossary, too, is found here of the many terms which have sprung into existence to meet the requirements of modern cytological research, and carefully prepared indices, both of authors and subjects, add greatly to the usefulness of the book as a work of reference. In every sense it is a model of good book-making, which might with profit be copied by many an author and publisher.

But while we cannot repress the desire to speak thus of the physical attractiveness of the book, it is more particularly its clear and elegant statement of our knowledge of the cell, of its structure and of its functions, in so far as they bear upon the processes of reproduction and heredity, which we would bring to the notice of our readers.

The half century which has elapsed since the enunciation of the cell-theory by Schleiden and Schwann has added ever-increasing evidence of the correctness of that theory, until now the anatomist, the physiologist, and the pathologist, whether of plant or animal life, seeks in the cell the ultimate explanation of all the phenomena which he would interpret. It is but natural, then, that we should look to the cell for light upon the various problems of heredity, and in Prof. Wilson's book we find an able and entertaining exposition of all those structural and physiological properties of the cell which have bearing upon these problems.

The subject is very properly introduced by a historical sketch of the development of our ideas of cell structure and function and of the various theories of inheritance. This is followed in successive chapters by statements of the general morphology of the cell, of the process of cell-division, of the peculiarities and mode of origin of the germ-cells, of fertilization of the ovum, of the preparation of the germ-cells to participate in the conjugation incident to fertilization, of those aspects of cell-chemistry and physiology which furnish suggestions as to heredity, of segmentation or cleavage of the fertilized ovum; and, finally, the various theories of inheritance and development are discussed in the light of our present knowledge of all these phenomena.

It is impossible within the narrow limits of a review to give any adequate statement of the conclusions arrived at. In general it may be said that Prof. Wilson agrees with Hertwig, Strassburger, Kölliker, and Weismann in attributing the predominant influence in heredity transmission to the chromatin of the nucleus. While realizing the significance of this fact, it is, nevertheless, admitted that "the explanation of development is at present beyond our reach." "Despite all our theories we no more know how the properties of the idioplasm[1] involve the properties of the adult body than we know how the properties of hydrogen and oxygen involve those of water. So long as the chemist and physicist are unable to solve so simple a problem of physical causality as this, the embryologist may well be content to reserve his judgment on a problem a hundredfold more complex." Regarding the historical origin of the idioplasm it is stated that "the idioplasm of every species has been derived by the modification of a pre-existing idioplasm through variation, and the survival of the fittest. Whether these variations first arise in the idioplasm of the germ-cells, as Weismann maintains, or whether they may arise in the body-cells, and then be reflected back upon the idioplasm, is a question on which, as far as I can see, the study of the cell has not thus far thrown a ray of light." "We are utterly ignorant of the manner in which the idioplasm of the germ-cell can so respond to the play of physical forces upon it as to call forth an adaptive variation."

Incomplete and unsatisfactory as these conclusions may appear, they nevertheless represent a distinct advance toward the solution of the profoundest problem of biology. "The splendid achievements of cell-research in the past twenty years stand as the promise of its possibilities for the future, and we need set no limit to its advance. To Schleiden and Schwann the present standpoint of the cell-theory might well have seemed unattainable. We cannot foretell its future triumphs, nor can we repress the hope that step by step the way may yet be opened to an understanding of inheritance and development." J. S. E.

[1] "The substance now generally identified with chromatin, which by its inherent organization involves the characteristics of the species. The physical basis of inheritance."

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.D., LL.D.,

PROFESSOR OF MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

Treatment of Opium-poisoning by Potassium Permanganate.—Dr. William Ovid Moor points out that atropine, cocaine, veratrine, pilocarpine, aconitine, caffeine, hyoscyamine, hyoscine, and phosphorus treated by the permanganate solution give rise to no reaction. Entirely otherwise is it with opium and its alkaloid morphine. After reporting his personal experience of antagonizing one-half grain of morphine by seven grains of the permanganate in eight ounces of water taken immediately after, he advises the use of this antidote, subcutaneously in from $\frac{1}{2}$ to 1 per cent. solution, in severe cases of ether- and chloroform-poisoning; asphyxia from illuminating-gas, drunkenness, laryngeal obstruction; and in uræmia, eclampsia, and similar cases, in addition to the ordinary methods. More than ninety instances of its successful use in opium-poisoning have been reported. These indications are offered: (1) Internally, seven or eight grains in diluted solution, to antidote the opium or morphine in the stomach. (2) To neutralize morphine which is returned to the stomach from the circulation, one grain in solution, frequently repeated. (3) As a physiological antidote, subcutaneous injection of 1 per cent. solutions.—*Therapeutische Wochenschrift*, 1897, No. 7, S. 147.

[The reports of its successful use, already of considerable number, lead to the conclusion that this should be considered as the antidote of choice.—R. W. W.]

Acetic Acid as a Menstruum and Solvent.—Prof. Joseph P. Remington has undertaken a series of experiments to ascertain whether this drug cannot be made to replace alcohol in at least some of the preparations now in common use. The antiseptic power is frequently overlooked. Slightly acidulated liquids are palatable to most patients, and these, when combined in prescriptions with syrups, are particularly acceptable, inasmuch as the

acid counteracts the cloying sweetness of the syrups. Further, it is desirable to have alternative preparations of the same drug to give to patients who are liable to become victims to the alcohol-habit. In an elaborate study it was found that acetic acid could advantageously replace alcohol in the extraction of a drug like nux vomica. A number of other drugs have been exhausted with varying strengths of acetic acid, such as sanguinaria, kola, ipecacuanha, squill, cinchona, and colchicum seed.—*American Journal of Pharmacy*, 1897, No. 3, p. 121.

Digitalis and Digitaline.—Dr. Henri Huchard states that the generally received opinion is that of all the preparations of digitalis that obtained by maceration possesses the most marked diuretic properties, while digitaline shows the least. This, however, is an error, and in every case the plant possesses properties very variable, according to the country in which it grows; this is shown by the great variations in dosage, and in this way may be explained the harmlessness of the very large doses used in Roumania in the treatment of pneumonia. Further than this, faulty methods of preservation and the substitution, in part, of leaves similar in appearance (*Coniza squamosa*) give rise to variations in strength. Thus some failures which have been attributed to too great degeneration of the myocardium should rather have been laid to faulty methods of collection and preservation. For these reasons the infusion, from a pharmaceutical standpoint, should be considered as an inferior preparation to crystallized digitaline, which is always the same. Further, it is denied that this glucoside is inferior in diuretic power to the infusion of the leaves. After a discussion concerning the various glucosides the conclusion is reached that there is only one crystallized digitaline, and that is the French, which has the chemical formula $C_{31}H_{50}O_{10}$. An important fact, which has not been taken into consideration by those investigating the infusion, is that the leaves contain large quantities of calcium and potassium chlorides. The latter is an energetic vaso-constrictor, and the elevation of arterial tension which it produces, even after section of the cord, appears to indicate that it has a local and direct influence upon the muscles in the vessel-walls, and in addition this salt belongs to that class of very diffusible agents which have a great power of filtration through animal membranes, which explains their diuretic action. The calcium chloride also acts upon the heart in that it increases its contractile energy, and, in very large doses, paralyzes it. The presence in the infusion of these very soluble salts, which have a real action upon the heart and cause diuresis, explains, in part at least, the close identity of action of the infusion with the crystalline digitaline, which is absolutely insoluble in water. Besides, we must not forget that the former contains digitaleine, which is soluble in water.—*Journal des Praticiens*, 1896, No. 48, p. 753.

Snake-bite Treated by Calmette's Antivenene Serum.—Mr. S. J. Rennie reports a successful case A boy of eleven years was bitten upon the inner side of the right foot by a krait (*Bungarus cæruleus*), that most deadly and dangerous Indian snake. The leg was promptly bound, and within a few minutes about two drachms of antivenene were injected into the subcutaneous cellular tissue of the boy's abdomen. At the same time the wounds and their

immediate neighborhood were treated with a hypodermatic solution of potassium permanganate, after which they were carefully washed and dressed. The patient never had a bad symptom, and shortly was running about as well as ever. Although the snake was not captured and killed, the testimony of eye-witnesses established its identity.—*British Medical Journal*, 1896, No. 1873, p. 1501.

Recent Observations upon Antitoxin.—Dr. Luigi Concetti has treated, within eighteen months, 77 children. In 54 the Klebs-Loeffler bacillus was found; in 2 the examination was negative; in 21 it was not made. The death-rate was 20.77 per cent.; in the 40 hospital patients, 25 per cent.; in the 37 private patients, 16.21 per cent. The causes of failure are due (1) to too late application of the remedy; (2) secondary and concomitant infections (streptococci, staphylococci, diplococci); (3) rapid asphyxia from invasion of the bronchial system; and (4) feeble resistance of the organism from too early age or the presence of other severe diseases (measles, scarlet fever, tuberculosis). Quite likely the parsimony in the use of the serum should be added to this enumeration. Of favorable symptoms, in addition to those usually noted in connection with the use of the remedy, may be cited the retention of the appetite and the ability to sleep. In conclusion, it is stated that the antidiphtheritic serum is perfectly harmless, and its curative powers in the presence of diphtheria are beyond doubt. Further, in a case of extreme gravity that physician is blameworthy who does not make use of this remedy, in the same way that a death from grave malarial infection can be justly ascribed to the physician who omitted the use of quinine altogether or who gave it too late or in insufficient dose.—*Bulletino della R. Accademia Medica di Roma*, 1896, Fasc. vii.

Tincture of Myrrh in Diphtheria.—Dr. E. Graetzer very strongly recommends the internal use of this preparation. The formula is: tincture of myrrh, 1; glycerin, 2; and distilled water to 50 parts. This should be administered every hour during the day and every second hour during the night; in severe cases every half-hour. Under two years the dose is a teaspoonful; to the age of fifteen, a dessertspoonful, and for older patients a tablespoonful. Although local treatment is not considered to be essential, yet it is stated that the recovery was more rapid if, at the above intervals, a gargle of an ounce of chloroform-water (1 to 200) was used with the larger children. Also, the tonsils can be painted with the pure tincture every hour, and in laryngeal diphtheria the first-mentioned solution may be inhaled. Of ten patients all recovered, and although in the last seven cases preparations were made for the use of antitoxin, the improvement was so rapid that injections of it were not necessary. The explanation of the effect of the drug is in its action in increasing the number of white blood-corpuscles or destroying in the affected part the toxin and ptomaïne which are there developed.—*Münchener medicinische Wochenschrift*, 1896, No. 47, S. 1164.

The Use of Mercury Cyanate in Diphtheria.—Dr. F. Lueddeckens reports eighty-one cases with but a single death, and that due rather to simple than to diphtheritic cardiac paralysis. Externally he uses cold wet

compresses about the neck or alternating with hot ones. Locally he removes the necrotic material with a dull instrument one to three times daily and paints the entire pharynx with a solution of iron sesquichloride, and follows this with an application of ten drops of a 3 per cent. cocaine solution. If possible, a gargle of potassium chlorate, a teaspoonful to a glass of water, is used, or the mouth is washed at frequent intervals with the same solution. Internally, one or two lemons in sugared water, unirritating diet—the best of all is milk—a laxative, and the drug above mentioned, which can be administered with an antipyretic or an expectorant. A one-hundredth of a 1 per cent. solution is given in teaspoonful doses every hour, and, if gargling is not possible, the dose is retained in the mouth for a short time. The explanation of the action of the drug is not easy to determine beyond its local action in the throat, through which it should be slowly swallowed, and in the stomach and intestine, where it apparently lessens the catarrhal conditions due to the swallowed bacteria and their toxins.—*Therapeutische Monatshefte*, 1896, Heft 11, S. 585.

The Treatment of Tuberculosis.—Dr. John William Moore believes that milk, eggs, butchers' meat, and fish should form the staple food for phthisical patients. Should the appetite flag, nourishing light meals should be given at shorter intervals than in health, the invalid being sometimes fed as a fever-patient. Cod-liver oil should be regarded rather as a food than as a medicine. Calcium chloride is a drug of extreme value not less in the preventive than in the curative treatment of phthisis. Fluid extract of condurango in thirty-drop doses in water relieves the distressing dyspepsia. Vomiting is often relieved by swallowing a cocaine-tablet. Salol and guaiacol carbonate are among the antiseptic remedies which do good in the diarrhœa.—*Therapeutic Gazette*, 1896, No. 11, p. 727.

Tanosol.—Dr. G. Kestner presents a brief report of the use of the drug known by this name, which is a synthetic remedy made from tannic acid and creosote. It is an amorphous, dark-brown, very hygroscopic powder, with a slight odor of creosote. Because the powder is volatile it should be dispensed in a solution or as pills. The advantages of the drug are its ready solubility in water, absence of caustic action upon healthy mucous membrane, and its non-interference with digestion. The usual single dose is a tablespoonful of the aqueous solution, containing about nine grains of creosote, and this is to be repeated thrice daily. After a few days double this amount can be taken. The best results were obtained in bronchial affections—marked lessening of the expectoration, diminution of dyspnœa, and increase of appetite. In tuberculosis the customary good results of creosote-administration are found, as above noted, and in addition an increase of weight and diminution in the number of râles.—*Therapeutische Monatshefte*, 1896, Heft 11, S. 609.

The Action and Use of the Thyroid Gland upon the Organism.—Dr. A. Chassevant states that thyroid medication is not inoffensive, and that it should be prescribed with prudence. It has been regarded as a heart-poison which can cause death by syncope (Beclère), and thyro-iodine, isolated from

it, is very poisonous (Notkin) and possesses an excitant action upon the nervous system. Various accidents have been reported—urticaria (Howitz), transient papular erythema (Laache), fatal delirium of persecution (Stabel), glycosuria (Ewald), acceleration of pulse, elevation of temperature, nausea and vomiting (Haskovec), vertigo, malaise, dyspeptic disturbances, somnolence (Chantemesse and Marie). In *résumé*, it has acquired a just reputation in the treatment of myxœdema and of goitre; it may be useful in the treatment of idiots and obese persons in facilitating nutrition-changes; as for other applications, time must determine its value.—*Les Nouveaux Remèdes*, 1896, No. 21, p. 633.

Sparteine Sulphate in Surgical Anæsthesia.—Dr. Gilbert Geoffrey Cottam calls attention to the facts that in chloroform-anæsthesia (1) fatal cardiac syncope occasionally occurs during the initial stages of anæsthesia, and (2) in prolonged operations, or in operations upon debilitated subjects, marked depression, shown by diminution of pulse-volume and increased rapidity of beat, is of comparatively frequent occurrence. Digitalis, alcohol, and strychnine have been used with varying success, not sufficient to justify their habitual use. From a study of seven cases reported and of others the author concludes that (1) in sparteine sulphate, administered hypodermatically before the commencement of anæsthesia, in the dose of one-tenth of a grain, repeated according to the nature of the operation and the condition of the patient, we have a safe, efficient, and prompt heart-stimulant in chloroform-narcosis. (2) It is not necessary to combine it with morphine or to use it in larger dosage than specified above. (3) Other things being equal, there are less shock and prompter reaction with its use.—*Therapeutic Gazette*, 1896, No. 11, p. 721.

The Dangers from Blisters.—M. Comby reports an instance which should be a warning against the use of cantharidal vesication in children. The symptoms suggested the existence of meningitis: stiffness of the neck, agitation, delirium, and anuria. Auscultation showed only a few insignificant râles. The temperature was 102.2° F., and the anuria was almost total. These symptoms disappeared after the use of prolonged warm baths and diuretic drinks. After some days of fever convalescence was established.—*Journal des Praticiens*, 1896, No. 46, p. 732.

The Treatment of Typhoid Fever by Internal Bathing.—Dr. Henry Duchenne describes this as consisting of (1) obliging the patient to drink as much as he will of inert liquids (teas, slightly acid drinks, weakly alcoholic beverages), and (2) giving a daily lukewarm enema of from one to two pints. For suggestive effect two doses of quinine sulphate of five grains each, and five drachms of a 2.5 per cent. solution of carbolic acid, the latter in the enema. The diet is milk, not bouillon, which is poisonous if the kidneys be affected; nor starches or clear soup, but two, three, or four pints of milk, two or three weak alcoholic drinks, various teas, but never astringents, not even wine. The results are a rapid diminution of the diarrhœa, lowering of the fever, which rarely exceeds 102.2° F. after the fourth

or fifth day of treatment, and convalescence is established upon an average on the twenty-first day. Thirty-five cases are reported, of which two died, one of which was an old alcoholic subject. It is not believed that any other method in country practice could give so low a percentage of deaths.—*Bulletin Général de Thérapeutique*, 1896, 20e liv. p. 627.

Intestinal Lavage.—Dr. E. Thiercelin states that this is indicated in all conditions of intestinal fermentation. For clearing the upper portion of the tract lavage of the stomach and purgatives may be resorted to; afterward the intestine should be washed out as soon as is possible, and this repeated several times daily after each stool. In gastro-intestinal infections of a pyretic type water of a temperature of 77° F. should be used, one or two pints in amount (for nursing-infants), which will lower the body-temperature from one to two and one-half degrees. In the algid type, on the other hand, water at nearly body-heat should be used. In addition to cleanliness and temperature-effects these lavages possess another valuable property—that of assuaging thirst and modifying blood-pressure through the water which is absorbed by the alimentary mucous membrane. In addition, the blood being diluted, the hepatic and renal functions are re-established. The water used may be plain or slightly salted (seven *per mille*). The amount used may be as above for a nursling, or three, four, or even five pints for older children. The contraindications are cardiac disease and intestinal narrowings and ulcerations.—*Revue de Thérapeutique*, 1896, No. 23, p. 709.

The Treatment of Epithelioma.—M. du Castel writes of the treatment of epithelioma, especially of the face, by means of methylene-blue associated with chromic acid. Methylene-blue is irritant and toxic, but we need its irritant and destructive properties in attacking this form of tumor. Its poisonous properties need not alarm us, because fifteen grains per day can be given to a man and there is no likelihood that this amount will be absorbed. The ulcerated surface is cleansed by means of potato-poultices, which have been cooked in a 1 per cent. sublimate solution. Exuberant granulations or cicatricial tissue are touched by the galvanocautery so that the drugs can penetrate to the deepest layers of the disease. The surface is then anæsthetized by means of a cotton-compress moistened with a 10 per cent. cocaine solution. The entire surface is now moistened with a tampon saturated with a solution of methyl [methylene] blue 1, in alcohol 5, and glycerin 5. Next an application of an aqueous solution of chromic acid, 1 to 5, is made to the same surface. Above this is applied more of the methylene-blue solution, then the excess of coloring-matter removed, and the above-mentioned poultice again applied. This treatment is repeated four or five times at two- or three-day intervals, until the newly formed skin no longer absorbs coloring-matter. In place of the poultices succeeding the applications, a layer of collodion may advantageously be substituted. The best results are obtained when the disease is superficial. It is useful also to delay further progress in inoperable cases. The reason for the non-absorption of the chromic acid is probably that the methylene-blue determines a serous exudation which prevents absorption of the acid which is afterward applied.—*Bulletin Général de Thérapeutique*, 1896, 22e liv. p. 693.

MEDICINE.

UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,

PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND;

AND

GEORGE DOCK, M.D.,

PROFESSOR OF MEDICINE IN THE UNIVERSITY OF MICHIGAN.

New Tuberculin Preparations.—R. KOCH. (*Deutsch. med. Wochenschr.*, No. 14, 1897.) There are two kinds of immunity: a toxic, as in tetanus, and a bacterial, as in cholera. The ideal immunity is that in which the body is protected against both the germs and their poisons. The prospect for an immunity in tuberculosis seems unfavorable, yet in miliary and in experimental tuberculosis there seems to be a sort of immunity because at a certain stage of the disease the germs disappear It has been the endeavor of the author to bring about such immunity early enough to save the individual. In ordinary tuberculosis of the lungs the germs grow slowly, are generally surrounded by necrotic tissue, and are probably only absorbed after having undergone marked chemical change. An immunity is hardly to be expected unless the germs come into direct contact with the living tissues, as in miliary and guinea-pig tuberculosis. All efforts to cause bacilli to be absorbed have failed in the author's hands. The dead bacilli injected caused abscess, and could be demonstrated in the pus for months. Injected into the peritoneal cavity they were somewhat better absorbed, but most of the animals died from the secondary effects of the injection. Injected into the circulation the bacilli caused tubercles in the lungs, but were not themselves absorbed. It was next attempted to make the bacilli absorbable by treating them with acids and alkalies; this was in a measure successful, but no immunity was obtained. The next step was the use of the soluble portions of the bacilli. The use of glycerin gave tuberculin. This has proved of value in the diagnosis of tuberculosis in cattle, and should be used in the same way in men. There is no danger of lighting up quiescent disease, as the author's experience in more than 1000 cases has shown. Tuberculin gives a sort of immunity against the toxin, but none against the germs. Koch has lately directed his efforts to obtaining an immunity against the bacteria. Cultures were extracted for three days in a 1-10 normal NaOH solution with frequent stirring, filtered and neutralized. This solution, known as TA, had the same properties as tuberculin, but was less stable, and was given up. Tubercle-bacilli possess a fatty acid capsule which gives them their peculiar staining-properties and which so protects them from outside influences that they are not absorbed. Koch next tried so to destroy this capsule by mechanical means that the bacilli might be absorbed by the tissues. This was accomplished by rubbing thoroughly dried, young virulent cultures in an agate mortar with an agate pestle. This mass was mixed with distilled water and centrifugated,

the rubbing and centrifugating repeated with the solid portion until a series of clear fluids was obtained. The first fluid was designated as TO, the others as TR. Both are completely absorbable and non-abscess-forming. The TO contains the substances soluble in glycerin and acts essentially like tuberculin and TA. TR contains the substances not soluble in glycerin and immunizes decidedly. When TR is given it may produce a reaction; this is not necessary to its effect. The author tries to avoid a reaction, but yet to get patients as rapidly as possible immune to large doses of TR, and he thinks against the bacilli, too, as such patients no longer react to tuberculin or to TA. Twenty per cent. of glycerin is added to the preparation for preservation. The fluid is diluted with normal salt-solution before injecting. He begins generally with $\frac{1}{500}$ mg. and increases to 20 mg. With this preparation Koch claims to have completely immunized a large number of guinea-pigs against repeated infection with virulent cultures. Cure of tuberculous animals is only possible if the treatment is begun promptly after the infection; this applies as well to people, where the injections must be made early and before the infection becomes mixed. Koch has treated a number of patients, and claims to have had good results, especially in lupus. Koch is not sure that he has used his preparations to the best advantage, and suggests that a combination with serum might be better. As far as preparations from cultures go, however, he thinks these are the best we can expect to get.

Tricuspid Murmurs; Localization of Systolic Mitral Murmurs.—HEITLER (*Wiener klin. Wochenschrift*, 1897, No. 17) has carefully studied systolic murmurs at the tricuspid and mitral areas. He thinks that tricuspid murmurs are more common than they have been supposed to be, and that his results will essentially modify the usual views as to the distribution of these murmurs. The author's observations have convinced him that the dogma that murmurs of different timbre are different in origin must be abandoned. He holds that murmurs are formed of a mixture of sounds and that these are not transmitted as a whole in all directions, but certain portions are heard in those places where the circumstances for their transmission are most favorable. The part that is well heard along the left ventricle wall differs from that which is well transmitted toward the right. Heitler further denies the dictum that when murmurs are heard in two different areas two murmurs are present, even if the murmur is less loud between the two areas. In one case, where autopsy showed the presence of mitral regurgitation alone, there was a loud musical murmur at the apex, growing fainter toward the base; there was a loud murmur in the aortic area with the same acoustic character as the one at the apex. The same thing may happen in the direction of the base of the sternum. The murmur of mitral regurgitation may be loudest at almost any point to the left of the left sternal border below the second interspace. Less frequently it is loudest in the aortic area, very rarely at the lower part of the sternum. Walshe alone has called attention to the tricuspid as the point of greatest intensity of mitral systolic murmurs. It is of the greatest value to auscult the heart as the contractions weaken. From the disappearance of certain of the murmurs or the appearance of pure tones where murmurs were heard before, an indication of the real origin of a murmur may be obtained.

The statements of authors concerning murmurs in the tricuspid are not very clear. Walshe describes them best: "They are faint and deep, with their greatest intensity over the ensiform process or at its base." Heitler's own work has shown that these murmurs possess striking acoustic characters. They are soft, faint, blowing, rarely rough; more superficial, shorter, and usually higher than the synchronous mitral murmurs. The area of distribution depends upon the intensity of the murmur. The loudest are audible over the entire sternum, generally plainest opposite the fourth interspace, and more distinct over the middle and left half than toward the right side of the sternum. Less frequently is the murmur loudest over the lower part of the sternum. The murmur is conducted to the right and left of the sternum, better toward the left than right. It is usually heard further to the left in the third than in the other interspaces. The fainter murmurs have a more limited distribution both upward and toward the left. They disappear at the level of the third rib; often they are only heard over the lowest part of the sternum and sometimes only over its left half. The diagnosis of tricuspid from mitral murmurs is generally easy, the acoustic properties are so different. The tricuspid murmurs in various diseases of the heart differ only by shades. The author thinks anæmic murmurs having the characters of mitral murmurs are caused by non-closure of the mitral valves, due to widening of the orifice, or weakness of the heart and papillary muscles, and that it is possible in some cases to say to which factor the murmur is due. Murmurs often occur early in disease of the heart-muscle, before any enlargement of the heart can be made out. These are due to disease of the papillary muscles, and are important but not serious signs.

The Alleged Lactic-acid Content of the Urine in Osteomalacia.—HOFMAN (*Centralbl. f. innere Med.*, 1897, No. 14) opposes the view, still held by many, that lactic acid occurs in the urine of osteomalacia. This idea, he thinks, is based upon the claim of C. Schmidt and O. Weber, that lactic acid occurs in the bones of such patients, and upon the improper conclusion that such acid must be at once excreted by the kidneys. Hofman examined the urine of two patients with advanced osteomalacia, using a slight modification of Salkowski's method. The physical character of the urine in both cases was negative, neither contained albumin or sugar. Although large amounts were used, 15 and 20½ litres, no lactic acid could be demonstrated.

The Phonendoscope and the Friction Method.—GROTE (*Münch. med. Wochenschr.*, 1897, No. 10), using a slightly modified form of Bianchi's instrument, agrees with Egger that high-pitched tones are not well transmitted. He thinks, however, that the phonendoscope may have a certain value for faint râles and heart-tones. With Bianchi's method of radial centripetal stroking the author found that the sound began to be heard suddenly, that its character was the same over different organs, and that as the instrument was moved the outline moved in the same direction or changed its shape. This depends simply upon the fact that the friction-tone is heard only when the skin on which the instrument rests is moved by the rubbing. The outlines depend on the strength of the friction, the point of application, and the tension of the skin about the instrument. As the skin became more

tense the sound became harsher and louder. Grote thinks the apparent coincidence of the phonendoscopic outlines, as obtained by Aufrecht, with the real position of the heart, can be explained by the normal lines of tension in the skin. These run in such a way that if the instrument is placed in the fourth interspace on either side of the sternum one can obtain a somewhat triangular figure with the apex directed out and down, varying in size according to the texture of the skin. That the one on the left side does not necessarily correspond with the heart-area is illustrated by a cut showing the dull area of a dislocated heart lying almost entirely outside the area found by the phonendoscope. Several cuts illustrate the points made.

A Case of Congenital Dextrocardia, with a Contribution to the Application of Roentgen Rays in Internal Medicine.—VEHSEMEYER (*Deutsche med. Wochenschrift*, 1897, No. 12) reports a case of congenital dextrocardia, with a skiagram. The patient was sixteen years of age, undersized, left-handed; upper part of spine slightly curved toward the left. Apex-beat in the fourth interspace to right of the sternum, a little inside the nipple-line. No heart-dulness to left of sternum, but on the right side dulness from the upper border of the third rib, extending half a finger beyond the nipple-line and to the right edge of the sternum. No transposition of the abdominal contents. The heart-tones were pure. In the skiagram the heart-shadow is seen to the right of that of the spine, merging with it. The diaphragm is higher left than right.

The author thinks this may indicate that the weight of the heart has something to do with the normal lower position of the left side, or it may mean that no transposition of the lungs was present, and that the unusual position of the diaphragm was due to the lessened pressure in the left half of the thorax. Congenital dextrocardia is much less common than situs viscerum transversus. The author found twenty-six cases where a clinical diagnosis was made and eleven in which the condition was discovered post mortem.

Hematoporphyrinuria.—NAKARAI (*Deutsches Archiv f. klin. Med.*, 1897, Band 58) examined the urine of 144 patients with 39 different diseases, and found hematoporphyrin ten times. In all the cases (six) of plumbism, in two cases of intestinal tuberculosis with hemorrhage, in one case of rheumatism with pericarditis, and once in empyema after long-continued use of sulphonal. The color of hematoporphyrin containing urine is not distinctive. Nakarai thinks it is a constant symptom in lead-poisoning. It is rare in other diseases, occurring, however, in sulphonal-poisoning and in intestinal hemorrhage. Concerning its origin in normal urine, where it is said to occur in traces, but little is known. Its diagnostic significance in disease, and whether the intestinal hemorrhages in sulphonal- and lead-poisoning are the sole causes for its occurrence in these diseases, cannot yet be determined.

Uric Acid Excretion in Croupous Pneumonia.—DUNIN and NOWACZEK (*Zeitschrift für klinische Medicin*, 1897, Band xxxii. Heft 1 and 2) report five cases showing the effect that croupous pneumonia has on the elimination of uric acid. They first review the theories advanced regarding the origin of uric acid in the organism, and refer to the work of Kossel, who showed the

close relationship between uric acid and the xanthin bases. The latter are simply antecedents of the former, containing less oxygen in the molecules and consequently being less highly oxidized products of metabolism. Horbaczewski was the first to show experimentally that uric acid was derived chiefly from the nuclein of the organism. He also demonstrated that if the oxidation of the nuclein be insufficient, xanthin bases and not uric acid resulted. Horbaczewski believed that the cell-nuclei in the body provided the nuclein from which the uric acid is derived, and further believed that uric acid was chiefly derived from leucocytes, which undergo destruction more readily than other cellular elements. He stated that there was a definite relationship between the leucocyte count and the amount of uric acid eliminated, an increase in the former being accompanied by a corresponding increase in the latter. The authors then refer to the work that has been done supporting or opposing Horbaczewski's view. Believing, themselves, that uric acid is derived chiefly from the nuclein resulting from the destruction of leucocytes, they held that diseased conditions associated with purulent exudations, in which this destruction is very marked, should show a marked increase in the excretion of uric acid. Such a condition is found in the resolution-stage of croupous pneumonia, where the products of leucocytic destruction are being constantly absorbed. Accordingly, they determined the uric acid elimination in five cases of pneumonia throughout the course of the disease. In all their cases the amount of uric acid began to increase the day before the crisis set in, and after the crisis suddenly increased so markedly that the amount eliminated was three times as great as during the febrile stage of the disease. This so-called "uric acid crisis" lasted from two to four days. For the next three or four days the amount eliminated gradually diminished, and by the seventh or eighth day after the crisis had once more reached normal. Their results accord with those of Ranke, Gerdes and Kühnan. Dunnin and Nowaczek did not count the leucocytes in their cases, so that it cannot be said that in these cases there is an association between the uric acid excretion and the number of leucocytes in the peripheral blood, as it is well known that the leucocytes usually fall to normal at the time or near the crisis. They believe, however, that their results strongly support Horbaczewski's view that the uric acid excretion is largely dependent on the nuclein derived from leucocyte destruction.

The Influence of Mitral Lesion on the Existence of Pulmonary Tuberculosis.—GRAHAM (*Montreal Medical Journal*, September, 1896) gives statistics compiled by a large number of observers showing the influence valvular lesions of the heart, particularly those of the mitral valve, have on the existence of pulmonary tuberculosis. There is much discrepancy in the results obtained from the statistics and in the opinions of many careful physicians.

In studying the clinical cases two difficulties present themselves: (1) the difficulty in diagnosis between mitral disease and pulmonary tuberculosis; (2) the trouble in deciding which is the primary lesion. French observers have shown that the pulmonary symptoms arising from mitral stenosis may closely simulate those of tuberculosis. Patients with the former may have dyspnœa, hæmoptysis and emaciation, as well as local consolidation. The pulmonary engorgement may cause an elevation in temperature. Whether

the heart-lesion is primary or secondary can only be decided by a very careful examination into the previous history as to the occurrence of rheumatism or not, or by the actual knowledge of the existence of the heart-lesion previous to the onset of the tuberculosis. The history of cases in which the two have coexisted during the middle period of life shows that the evolution of the tuberculosis was much delayed.

From the statistics and observations of eminent physicians the following conclusions may be arrived at:

(1) That mitral disease and pulmonary tuberculosis rarely exist in the same individual.

(2) That pulmonary tuberculosis is a very frequent sequel to pulmonary stenosis.

(3) The presence of mitral disease acts as a preventive to tuberculosis, especially when the vital powers are at or near their normal standard, and the prophylactic agency is shown in those who have a strong hereditary tendency to the disease, and whose surroundings are of a decidedly unhealthy character.

(4) In the small number of cases in which tuberculosis follows a mitral lesion during middle life its evolution is very much delayed. When, on the other hand, from age or bad habits, the vital powers are on the decline, the process is often as rapid as in ordinary cases.

There are a number of factors present in mitral lesions which may aid in the prophylaxis against tuberculosis:

(1) Increased pressure in the pulmonary circulation.

(2) The presence of transuded serum in the tissues, which renders foreign bodies more easily removed from the bronchial tubes, and which is believed by many to have a germicidal action.

(3) Increase in the involuntary muscular tissue, thus enabling the patient, more especially by coughing, to expel foreign matter from the alveoli and bronchi.

(4) The presence of an increased number of leucocytes in the alveoli.

Graham does not believe that the transuded serum has as marked a germicidal action as it is believed to possess. He states that in cirrhosis of the liver the same exudate exists in the peritoneal cavity, while it is well known that hepatic cirrhosis is frequently complicated by tuberculous peritonitis. He supports the view of Peters, that the passive congestion of the lungs acts as a prophylactic by producing an increased amount of chest measurement, especially at the apices, thus expanding the alveoli, under which circumstances there will be a diminished tendency to the development of tubercle.

The factors which Graham believes are of most importance in the prophylaxis against tubercle in mitral disease are:

(1) The increased amount of blood in the lungs.

(2) The greater expansion of the apices.

(3) The increase of the involuntary muscular fibres of the bronchial tubes and alveoli.

The reason why those who live in high altitudes are less liable to tuberculosis is attributed to the fact that it has been shown that in these persons there is a general hyperæmic condition of the lungs which is believed to retard the development of tuberculosis.

SURGERY.

UNDER THE CHARGE OF

J. WILLIAM WHITE, M.D.,

PROFESSOR OF CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; SURGEON TO THE UNIVERSITY AND PHILADELPHIA HOSPITALS;

ASSISTED BY

ALFRED C. WOOD, M.D., INSTRUCTOR IN CLINICAL SURGERY, UNIVERSITY OF PENNSYLVANIA; ASSISTANT SURGEON, UNIVERSITY HOSPITAL.

AND

C. L. LEONARD, M.D., ASSISTANT INSTRUCTOR IN CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA.

Symptoms and Treatment of Chronic Suppuration of the Maxillary Antrum.—BARON (*Bristol Medico-Chir. Journ.*, March, 1897) studies with great care the symptomatology and differential diagnosis of chronic suppurative disease of the antrum, and lays the greatest stress upon the positions in which pus will flow from the antrum and from no other sinus. These positions are with the head upon the knees or with the face upon the sound side, where the patient should lie for ten minutes. If pus exists and the drop has been previously removed, a drop of pus will appear at the lower border of the middle turbinated bone. There, of course, may be other conditions existing at the same time, as disease of the anterior ethmoidal cells, cleavage of the middle turbinated, or polypus in the nose.

The author notes the fact that many of these cases are treated as neuralgia. The diagnosis of this condition is never easy, and all symptoms must be considered in their logical sequence.

The treatment is drainage. If there be polypi, hypertrophic rhinitis, deformity of the septum, or any other condition, it must be treated to make the orifice into the antrum normally patulous. A second opening should be made by drilling through the alveolar border after removing an old tooth. Drainage must be maintained by a silver tube, which should be attached to a sound tooth, and antiseptic washings employed.

Septic Peritonitis Treated by Antistreptococcus Serum.—GRANDIN (*Medical Record*, April 3, 1897) reports a case of general suppurative peritonitis in which, after multiple incisions and drainage by multiple packings of gauze and by a large drainage-tube passed into the vagina, the infection yielded only after injections of the antistreptococcus serum.

In regard to the serum the author says: "I am far from claiming that the woman recovered because of the serum. It is always dangerous to draw positive conclusions from a single case. I find that the antistreptococcus serum has been used in many cases, irrespective of the determination as to whether the case of sepsis was due or not to streptococcus infection. The case I report is fallacious in this respect, for I neglected the very essential point of having the pus examined. Etiologically, I should assume that in my case the bacterium coli played a very prominent part, and we know that the antistrep-

tococcus serum is powerless against the bacterium coli. If, therefore, the serum entered as a factor in the recovery of my patient, it was because the case was one of mixed infection."

The antistreptococcus serum appeared to act as follows: temperature and pulse-rate were uniformly lowered after each administration; elimination of waste, infectious products was favored, as was evidenced by the greatly increased action of the kidneys; pus-production was checked; for, whereas before the use of the serum pus-pocket after pus-pocket was forming and infectious elements were being rapidly absorbed into the system, not alone after the injection of the serum did pus-production cease, but the infiltrated flaps cleaned up far more rapidly than the author had ever seen before. He had every reason to anticipate progressive systemic infection and death. He witnessed rapid throwing off of sepsis and recovery.

Effect of the Roentgen Rays on Calculi.—SWAIN (*Bristol Medico-Chir. Journ.*, March, 1897) made an interesting study of the various forms of calculi in relation to their penetrability by the x-rays when outside the body. As a measure he placed coins upon the plate to show absolute opacity. He found by his experiments that the probability of diagnosis by these means is greatest in the oxalate of lime calculus and least in the biliary calculus, phosphatic and uric acid calculi occupying an intermediate position.

In attempting to diagnosticate calculi by the x-rays a shorter exposure may give a better result than a long one. What we have to find out is the amount of exposure necessary for the rays to penetrate the ordinary tissues without completely penetrating the calculus.

The diagnosis of uric acid calculi in the kidney is likely to be a matter of some difficulty; and calculi in the gall-bladder, which give a lighter shadow still, will be even more difficult.

It was found that with a more prolonged exposure the detail of the more transparent objects became more marked, both in negative and print; but at length the negatives, although showing more detail to the eye, became so dense as to be unprintable. This difference between the negative and prints was not observable in the plates taken of living subjects, all these negatives being "thin." It is, however, desirable to see the negatives in all cases, to avoid missing shadows not observable in the print. The author also reports the case of a man from whom an oxalate of lime calculus was removed after it had been detected in a skiagraph.

Successful Removal of a Large Sarcoma of the Brain.—DUNCAN and MAYLARD (*Glasgow Medical Journal*, April, 1897) report a rare and interesting case of sarcoma of the brain which they successfully removed.

The patient was thirty-eight years of age, and had had convulsions for three years previous to presenting himself for treatment. The patient had had a chancre ten years previously, however without any systemic manifestations. He was put upon antisyphilitic treatment, and improved so markedly that he was discharged and told to continue his treatment, reporting from time to time. There was not, however, continued improvement, and he entered the hospital, six months later, to be operated upon.

After the dura had been exposed over the fissure of Rolando it was incised,

and a tumor presented itself, which extended further anteriorly. A further portion of bone was removed, when it was found possible to insert the fore-finger between the growth and brain-tissue. By gently insinuating the finger the tumor was easily enucleated, except in the region of the dura mater above, to which it was somewhat adherent. There was very little bleeding, but owing to the size of the cavity it was stuffed with iodoform-gauze.

The tumor weighed three ounces; it was oval, measuring three by two and one-half inches, and flattened. It was firmer than brain-substance. The capsule was strong. The tumor was a sarcoma, with rather large round-cells; some were oval.

The site of operation was selected on account of the convulsive twitchings of the left upper extremity, without reference to the pain and tenderness complained of by the patient; the latter proved to be the better indication of the seat of the tumor. The motor area must have been stimulated by the backward pressure of the growth. It was impossible to say from what particular intracranial structure the tumor grew.

The author regrets the use of drainage, as it induced the discharge of the replaced bone-disks, which eventually resulted in a hernia cerebri. The amount of brain-substance thus lost caused a contracture and paralysis of the forearm and a weakness on the left side of the face and in the left foot. The slight fits which the patient still has are probably due to the contracture of the scar. They are not frequent enough to be caused by such a return of the disease as would occur in three years and four months.

Diseases of the Gall-bladder and Bile-ducts.—In a recent lecture delivered at the Royal College of Surgeons in London MAYO ROBINSON (*British Medical Journal*, March 27, 1897) says that in gallstones in cholelithiasis the indications for operation are:

1. In frequently recurring biliary colic without jaundice, with or without enlargement of the gall-bladder.

2. In enlargement of the gall-bladder without jaundice, even if unaccompanied by great pain.

3. In persistent jaundice ushered in by pain, and where recurring pains, with or without ague-like paroxysms, render it possible that the case is gallstones in the common duct.

4. In empyema of the bladder.

5. In peritonitis starting in the right hypochondrium.

6. In abscess around the gall-bladder or bile-ducts, whether in the liver or under or over it.

7. In some cases where, although gallstones may have passed, adhesions remain and prove a source of pain and illness.

8. In fistula, mucous, muco-purulent, or biliary.

9. In certain cases of chronic jaundice, with distended gall-bladder, dependent upon some obstruction of the common duct, although the suspicion of malignancy be entertained. In such cases the increased risk must be borne in mind, as malignant disease may be the cause of the obstruction, and operation in such cases is attended with greater danger than ordinary.

10. In phlegmonous cholecystitis and gangrene, if the cause be seen and recognized at a sufficiently early stage of the disease.

11. In gunshot-injury or in stab-wounds over the region of the gall-bladder.

12. In suspected rupture of the gall-bladder without external wound.

13. In some cases of chronic catarrh of the gall-bladder or bile-ducts.

14. In suppurative cholangitis.

The safest exploratory measure is an exploratory incision followed by palpation of the gall-bladder and ducts, or possibly by aspiration. Aspiration and sounding are dangerous procedures of themselves, as there is the danger of infection of the peritoneum by escaping bile through the puncture of the bladder-wall.

Th indications given for cholecystotomy or cholecytostomy are:

1. In all cases where the gall-bladder is sufficiently large to permit of drainage after gallstones have been removed from the gall-bladder or ducts.

2. In cases where there are gallstones in the ducts, but the patient is too ill to bear a prolonged operation, the gallstones being deliberately left for treatment by some solvent solution.

3. In emphysema of the gall-bladder, where that viscus is not too much disorganized to be permitted to remain.

4. In certain cases of chronic catarrh of the gall-bladder or bile-ducts.

5. In suppurative cholangitis.

6. In obstruction of the ducts due to hydatid disease.

7. In dropsy of the gall-bladder.

8. In idiopathic rupture, or laceration, or gunshot-injury of the gall-bladder or ducts.

9. In cases of choledochotomy, in order to avoid tension in the sutured duct.

10. In certain cases of obstructive jaundice dependent on malignant tumor which is occluding the ducts; but in these cases the increased danger must be borne in mind.

11. In some cases of phlegmonous cholecystitis or gangrene, when the patient is too ill to bear cholecystectomy.

After the operation a non-perforated drainage-tube is inserted and the edges of the gall-bladder are sutured to the aponeurotic layer of the abdomen, not to the skin, thus avoiding the danger of fistula. It is preferable to suture the peritoneum of the viscus to the parietal peritoneum when this is possible. In ordinary cases the drainage-tube is shortened on the second and third days and removed on the fourth or fifth.

In cases of contracted bladder that is deeply situated the operation may be difficult. The author has succeeded in some cases by forming a serous tube out of the right border of the omentum surrounding the drainage-tube, or by tucking down the parietal peritoneum and suturing it to the gall-bladder. Where neither of these is possible the packing of iodoform-gauze about the tube is successful.

The Murphy "button-tube," the author thinks, is not often applicable in these difficult cases. In certain cases where the gall-bladder is much contracted the line of incision may be sutured and drainage by iodoform-gauze carried from this line to the abdominal incision, or the incision may be deliberately left patent and the bile allowed to run into the right kidney-pouch, from which it is removed by a drainage-tube in the loin.

The so-called "ideal" operation has the great disadvantage of not allowing drainage of the biliary tract for a time; it is possible to open the gall-bladder, suture it and the parietal incision, and obtain primary union, but drainage does more good.

The operation in two stages does not permit of a thorough exploration of the bile-ducts, as after the healing of the bladder in the parietal incision access to these parts is impossible.

Calculi in the common bile-duct. In some cases it may be impossible to remove stones that have become imbedded in the common duct by forceps or scoop through the gall-bladder. Under the circumstances the stone may be crushed or removed by choledochotomy, or, under certain circumstances, cholecystenterostomy may be performed.

The presence of jaundice with distended gall-bladder is presumptive evidence in favor of malignant disease, but jaundice without the distended gall-bladder favors the diagnosis of cholelithiasis.

The special symptoms which point to stone in the common duct are absence of enlargement of the gall-bladder, with frequent attacks of mild pain followed by jaundice or its intensification, which in many cases never quite disappears. The pain is in the epigastric rather than in the right hypochondriac region, and passes through to the right dorsal or lumbar region rather than to the right infrascapular. Where jaundice is intense and without much variation, especially if the gall-bladder be enlarged, there is usually malignant disease or some other cause than gallstones.

In a few cases a stone may be pressed back into the gall-bladder, but they are seldom found, possibly on account of the contraction of the gall-bladder and cystic ducts. Occasionally a small stone may be pressed into the duodenum, but this is rare, and not infrequently it is pushed into a dilated diverticulum of Vater, and so missed, and the whole operation rendered futile.

Cholecystostomy, with treatment by solvent injections later, is simple and safe, and will give immediate relief with a minimum risk and render the patient better fit for subsequent treatment if it is required.

In cholelithotrity the incision may need to be enlarged so that the stone may be palpated *in situ*. If the right hand be used, the thumb will enter the foramen of Winslow, the index-finger passing in front of the common duct; the position is reversed if the left hand is used. Usually the gallstone flattens out in wafer-shape; the concretion is converted into pulp or breaks up into innumerable fragments, which can be passed on toward the duodenum or subsequently washed through.

The disadvantages of this method are the dangers to the walls of the duct and the return of the stone-formation caused by fragments left behind. Meddling is dangerous from the injury to the walls and subsequent infection.

Choledochotomy is the opening of the bile-ducts for the extraction of gallstones in cases where they cannot be removed otherwise.

Choledocho-duodenostomy is a term applied to a modification of choledochotomy where a gallstone is impacted and removed from the diverticulum of Vater through an incision in the duodenum.

Cholecystectomy or excision of the gall-bladder is indicated: 1. In bullet-wounds or other wound of gall-bladder where suture is impossible. 2. In phlegmonous cholecystitis. 3. In gangrene of the gall-bladder. 4. In mul-

tiple or perforating ulcers. 5. In chronic cholecystitis from gallstones where the gall-bladder is shrunken and too small to drain safely, and where the common duct is free from obstruction. 6. In mucous fistula due to constriction of the cystic duct. 7. In hydrops of the gall-bladder due to stricture of the cystic duct, as also in certain cases where the gall-bladder is very much dilated. 8. In certain cases of empyema where the walls of the gall-bladder are very seriously deranged, and, 9, in cancer of the gall-bladder. It is contraindicated in all cases of non-patency of the common duct, and it should not be resorted to under the idea that it will prevent the formation of gallstones, as calculi may form in the bile-ducts within the liver or below it.

Cholecystenterostomy consists in establishing an artificial opening between the gall-bladder and intestine, preferably the duodenum.

The author concludes that this operation is indicated:

1. In biliary fistulæ depending on stricture or other permanent occlusion of the common duct.

2. Very occasionally in cancer of the head of the pancreas or malignant tumor of the common duct, leading to chronic jaundice and distended gall-bladder; but in such cases the mortality will be so high necessarily that the justifiability of the operation is questionable.

3. Occasionally in impaction of gallstones in the ducts, where the patient is not in a fit condition to bear the more prolonged operation of separating adhesions and crushing or removing the concretion by choledochotomy.

4. In certain cases of obstruction of the cystic duct where cholecystectomy is impracticable.

Contraindications. 1. In any obstruction of the bile-duct which can be cleared away with reasonable probability of success.

2. In malignant disease of the head of the pancreas or common bile-ducts leading to distention of the gall-bladder the mortality is so great (8 operations, 7 deaths) that it is hardly worth doing.

3. In contracted gall-bladder where it is impracticable to insert the button.

4. Where there are extensive adhesions which would produce kinking of the bowel.

5. In very large gall-bladders with obstruction of the cystic duct, where cholecystectomy should be done.

The Treatment of the Hypertrophied Prostate by the Galvanocautery.—BOTTINI (*Archiv für klin. Chir.*, 1897, Band liv. Heft 1) describes a new method of treating the diuresis accompanying the hypertrophied prostate, which he has perfected and which has produced both in his own hands and in the hands of other eminent surgeons results that are all that could be desired.

He describes the instruments, which he has had constructed according to his own designs, and the technique of the operation, illustrating his subject by the report of three clinical observations.

He claims for the operation the following points:

1. The unmistakable efficiency of the operation—a patient who has not urinated for years passing his urine of himself a few hours after the operation.

2. The harmlessness of the operation even in patients over eighty years of age with foul urine.
3. The permanency of the cure, no case as yet having been known to recur.
4. No post-operative bad effect or effect upon the morale of the patient.
5. The operation is painless and can be done without anæsthesia.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

OF PHILADELPHIA.

Anatomical Defects in the Anterior Palatine Folds.—Dr. James E. Newcomb contributes (*The Laryngoscope*, 1897, No. 4) an article on anatomical defects in the faucial pillars, noticing that forty-two cases have been published, including three of his own detailed in this paper. These defects, he states, are, according to the last edition of Quain's *Anatomy*, regarded generally as due to incomplete obliteration of the original branchial clefts.

Hay-fever.—Dr. W. F. Strangways (*The Laryngoscope*, 1897, No. 4) attributes the lesion to toxin or toxins which cannot be developed in the acid solutions. He therefore applies acidulated washes, and administers large doses of muriatic acid, well diluted; in some instances as much as one drachm in the twenty-four hours.

Anterior Turbinotomy.—Dr. Grant exhibited two cases of anterior turbinotomy to the Laryngological Society of London (*Proceedings of the Laryngological Society of London*, March 10, 1897), illustrating his method of removing the anterior portion of the lower turbinate body, instead of the whole of it, for obstruction to respiration.

Turbinotomy.—In a paper on "Turbinectomy or Resection of the Middle Turbinate; Report of One Hundred and Twenty Operations," Dr. J. A. Stucky states (*The Laryngoscope*, 1897, No. 4) that a slight hypertrophy of the tissues covering the tip of the bone is sometimes observed after resection of the anterior portion of the turbinate, and that in nine of his cases it was sufficiently excessive to necessitate its reduction, which was accomplished by light touches with chromic acid crystals.

In 62 per cent. of these cases the turbinate was so enlarged as to press tightly against the nasal septum and nearly occlude the middle meatus by contact with the inferior turbinate. They included thirty-five cases of stenosis due to hypertrophy and hyperostosis; forty-eight cases of polypoid degeneration and enlargement of the middle turbinate; three cases of cyst of the

anterior process; seven cases of acute frontal sinusitis; eleven cases of suppurative ethmoiditis, and sixteen cases of empyema of the maxillary sinus. Dr. Stucky states that the addition of an equal proportion of resorcin to the cocaine increases the anæsthetic effect of the cocaine and prevents any unpleasant or toxic effects of the drug.

Successful Operation for Sarcoma of the Nose.—Mr. H. Lambert Lack showed to the Laryngological Society of London (*Proceedings of the Laryngological Society of London*, March 10, 1897) a man, sixty-five years of age, upon whom he had operated for sarcoma of the nose in May, 1895, nearly two years before. The mass had been in the right fossa. In its extirpation the posterior nares were securely plugged first; then the wing of the nose was detached to permit freer access to the mass, and the morbid growth was torn out with polypus-forceps. After this the greater part of the lateral mass of the ethmoid was scraped away, the inner walls of the maxillary antrum and of the orbit being almost entirely removed; and the roof of the cavity was likewise scraped away. The large cavity was packed with iodoform-gauze and the post-nasal plug was withdrawn. The operation had been followed by considerable ecchymosis of the eyelids and cheek, but the patient had made an uneventful recovery and left the hospital in fourteen days. When presented to the Society there was not any sign of recurrence of the disease and there was not any deformity of the nose.

Anterior Epiglottiditis.—Under the heading "Angina Epiglottidea Anterior" Dr. W. P. Meyjes, of Amsterdam, reports (*Journal of Laryngology, Rhinology, and Otology*, March, 1897) a case of œdema of the anterior portion of the epiglottis in a male subject, forty-one years of age, producing very grave symptoms, which were combated principally by an iced spray of $\frac{1}{3}$ per cent. watery solution of ichthyol every quarter of an hour.

Reference is made to similar cases reported by Michel and by Moritz Schmidt.

Serum-treatment of Scarlatina Sore-throat.—In exhibiting a pharynx from a fatal case of scarlet fever which had been treated with antistreptococcic serum, Mr. Kynvett Gordon (*Proceedings of the Laryngological Society of London*, March 10, 1897) stated that, in his opinion, the serum was not of much value in cases where the septic symptoms appeared late and were due to absorption from sloughing tissues, but that he had obtained a strikingly good result when there was septicæmia at the onset and the serum had been given early.

The specimen exhibited showed sloughing of both tonsils and ulceration of the uvula. There was a chain of small ulcers extending from the tip of the epiglottis to the pyriform fossa on each side. The rhinopharynx had been full of sloughing adenoid tissue.

Tuberculosis and Syphilis.—Dr. E. Harrison Griffin writes an article upon tuberculosis and syphilis of the larynx (*The Laryngoscope*, 1897, No. 4), in which he states that a tuberculous ulcer and a syphilitic ulcer occur quite frequently side by side. He asserts that syphilis of the larynx is again and

again mistaken for tuberculosis and the diagnosis seemingly confirmed by microscopic examination of tuberculous sputum from coexistence of tuberculous disease of the lung; that syphilis in conjunction with tuberculosis, if both conditions be treated, renders the tuberculous disease less virulent, and prolongs the life of the patient.

He states that these are clinical facts that he has observed again and again when called upon to treat these lesions of the upper air-tract.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

EDWARD JACKSON, A.M., M.D.,

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC; SURGEON TO WILLS EYE HOSPITAL, ETC.

ASSISTED BY

T. B. SCHNEIDEMAN, A.M., M.D.,

ADJUNCT PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC; ASSISTANT SURGEON TO WILLS EYE HOSPITAL, ETC.

Typical Corneal Disease in Aniline-dyers.—SENN describes pigmentations and opacity of the cornea, with destruction of its epithelium, occurring in aniline-dyers. The portion of the cornea opposite the interpalpebral fissure presents a stripe of sepia-brown discoloration about 2.5 mm. in width by 6 mm. in length. The entire region is dull and gives a shimmering, marble-like reflex. The stripe consists of ten or twelve small vesicles, 0.5 mm. in diameter, irregularly placed; these elevations of the epithelium are filled with a clear fluid. Those which have ruptured give rise to shallow depressions. The bulbar conjunctiva shows an intense yellowish-brown discoloration under the form of two isosceles triangles with bases 3 mm. in length at the inner and outer limbus. The corneal epithelium throughout the entire region is very loosely adherent, so that it can be readily lifted off. The affection appears not to occur before the age of forty.

The causes of the disease are undoubtedly the volatile products of aniline oxidation, chinones. These are highly corrosive and discoloring. Abandonment of occupation is the only effective treatment. Special care in ventilation of workrooms and personal cleanliness are necessary to prevention.—*Correspondenzblatt f. Sckweiz. Aerzte*, xxiv. Jahrg. No. 6.

Extraction of Senile Cataract.—EBNER (Munich) reports 400 extractions of senile cataract by Prof. Von Rothmund.

Puncture and counter-puncture are made in the sclera, the centre of the section is placed in the corneal margin, usually with the formation of a narrow conjunctival flap. A very small iridectomy is made. Simple extraction is practised only in comparatively young and healthy subjects and if the other eye has been previously operated upon successfully. Soft, traumatic,

and adherent cataracts are extracted outward with iridectomy. Extraction downward is practised if the patient is unable to look down, and on deeply sunken globes. Cortex is evacuated by stroking the globe through the lower lid after removal of the speculum. Patients are kept in bed five or six days with both eyes bandaged.

From May, 1890, to July, 1896, Von Rothmund performed 458 extractions of senile cataract. For extraneous reasons 58 of these are rejected from the present statistics. Of the remaining 400, of which 25 were complicated, the visual acuity was satisfactory (at least 1/10) in 63.5 per cent.; 1.7 per cent. were total failures. In 60 cases the post-operative astigmatism was found a fortnight after operation to vary from 1.5 to 10 D., with an average of 4.7 D. In 45 patients who returned for examination the vision had improved spontaneously in 42 per cent. Discission was practised in 46 cases, with improvement of vision in 87 per cent. Cyclitis occurred in 2 cases. Iridodialysis took place in 1 case during operation. In 7 completion of the operation had to be postponed on account of hemorrhage following the iridectomy without detriment to the final result. In 24 cases preliminary iridectomy was practised. Dislocation of the lens while opening the capsule took place in 6 cases. Capsule-forceps were employed eleven times. The lens was extracted with Graefe's scoop in 19 cases. Loss of vitreous occurred in 13 cases, with termination in phthisis bulbi in 1. The largest amount lost was one-fourth of the whole. Corneal infection took place fourteen times, with loss of the eye in 4 cases. Iridocyclitis was noted in 19, twice after discharge from the hospital. In 10 of these the sight was lost. Secondary glaucoma occurred once in a highly myopic eye, with detachment of the retina.

As regards prognosis, while positive response to the usual tests is in general favorable, it does not absolutely exclude disappointments. Thus, in one case with normal function to ante-operative tests, an old detachment of the retina was found after extraction. On the other hand, 5 cases with complete lack of power to recognize colors resulted in good vision and presented no complications whatever. Of 39 cases of hypermature cataract the vision was satisfactory in but 18; in 10 cases of adherent cataract the result was satisfactory in 5.—*Münchener med. Wochensch.*, xliv. Jahrg., No. 16.

Pemphigus of the Conjunctiva.—H. D. NOYES (New York) reports the case of an Italian laborer, aged forty-eight years, admitted with symblepharon of both eyes. The first symptom to which he attached importance was that the eyelashes began to turn inward about a year before. The general atrophy of the conjunctiva demonstrated that the entropium was only the extreme stage of a process which had continued for a long time, but was not heeded until serious trouble to sight arose. The lower lids were adherent to the eyeballs, and the lower part of the corneas covered by a dense, glassy membrane continuous with the edge of the lid.

He was submitted to various plastic operations, including skin-grafting and the transplantation of flaps with pedicles, and persistent efforts to keep separated the surfaces of the lids and globe. But all treatment proved ineffective. The cornea grew dull, the part overlaid by thick epithelium became vascular, the clearer central part was soon overspread by vessels and its substance

infiltrated. In the end the whole cornea, save a small spot above, was covered by vascular pannus. Adhesion of the upper lid again took place, drawing the eye upward, while the lower lid likewise became more or less glued to the globe, and nothing which could fairly be called a sinus remained. The patient simply had perception of light.

This case is recorded as an instance of varied and persistent methods of surgical treatment whose result was entirely negative. In these cases the effort to keep the lids and globe separated is not only of no avail, but does mischief. Sight will continue longer if no plastic operations are done.—*New York Eye and Ear Infirmary Reports*, 1897, p. 1.

OBSTETRICS.

UNDER THE CHARGE OF

EDWARD P. DAVIS, A.M., M.D.,

PROFESSOR OF OBSTETRICS AND DISEASES OF INFANCY IN THE PHILADELPHIA POLYCLINIC; CLINICAL PROFESSOR OF OBSTETRICS IN THE JEFFERSON MEDICAL COLLEGE; CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE WOMAN'S MEDICAL COLLEGE; VISITING OBSTETRICIAN TO THE PHILADELPHIA HOSPITAL, ETC.

Rupture of the Uterus; Abdominal Section; Uterine Suture, followed by Recovery.—PÉE, a practising physician at Altenburg, reports in the *Centralblatt für Gynäkologie*, 1897, No. 12, the case of a patient who sustained a rupture of the uterus during her tenth labor. The presentation was a shoulder, and the physician in attendance endeavored to turn the child, but could not move the head; as the weather was intensely cold and a hospital some distance away, it was thought best not to remove the patient from her home. Abdominal section was accordingly performed and the child extracted, the tear in the uterus extending through the cervix and uterine muscle and separating the broad ligament extensively. The uterus was carefully stitched with fine silk, the peritoneal covering closed with catgut, the abdomen cleansed of blood-clot, and the uterus restored to its normal position. The abdomen was closed without drainage. The patient made an uninterrupted recovery.

The Importance of Retained Fœtal Appendages in Causing Malignant Growth of the Uterus.—In the *Centralblatt für Gynäkologie*, 1897, No. 15, ULESKO-STROGANOWA reports from the clinic at St. Petersburg a case of malignant decidual growth developing in the villi of retained chorion and placenta. Microscopic study of the materials obtained from the uterus showed that the elements of the foreign growth were derived from the villi of the normal placenta. The relations of the cellular elements to the maternal bloodvessels and basement-membrane were identical with those of the normal placenta. The development of free nuclei and cells was characterized by remarkable intensity.

In the *Annales de Gynécologie*, April, 1897, AUDEBERT and SABRAZÈS report an interesting case from the clinic at Bordeaux, of a patient who aborted when three months pregnant. The placenta was retained six months longer, and was spontaneously expelled at the normal termination of gestation. A detailed account of this examination is given, with drawings illustrating the growth of its cells. Septic infection did not occur in this case, and as a result it was found that the cells of the placenta developed with extraordinary vigor. The patient suffered from obstinate vomiting during this time, but had no other sign of toxæmia. The placenta seems to have acted as a malignant growth, and should certainly be treated as such in dealing with these cases. The writers call attention to the necessity for thoroughly cleansing the uterus, by the finger or curette, of all vestiges of the fœtal appendages. The microscopic examination of the placenta emphasizes the clinical conclusions of the writers.

The Accurate Measuring of Temperature during the Puerperal Period.—SARWEY, from the clinic at Tübingen, gives his results in the *Centralblatt für Gynäkologie*, 1897, No. 15, obtained from a careful measurement of temperature in puerperal patients. For twelve years it was customary in this clinic to measure temperature in the rectum, and in round numbers 6400 observations were made. The best time for such investigations was between 6 and 7 in the morning and 5.30 and 6.30 in the afternoon. It is thought that a more reliable temperature is obtained in the rectum than elsewhere in the body. 38.5° C. in the rectum is taken as a normal temperature. During the first twelve hours after birth a rise of temperature is often observed, while normal involution of the genital tract goes on, and no infection can be diagnosticated; this is commonly spoken of as "absorption fever." In other cases a local or general infection can be diagnosticated, which can be referred to the previous labor or the puerperal state. In others a purely accidental cause for fever, not connected with the puerperal condition, is present. It is also necessary to keep accurate record of the height and duration of fever in any patient, and of the number of attacks. In addition, the morbidity and mortality of any clinic may be computed from such records, and diagnosis confirmed by autopsy upon all fatal cases. The writer considers that to obtain strictly reliable records of puerperal cases the methods described must be followed.

A Report of Fifteen Symphysiotomies.—In the *Annales de Gynécologie*, 1897, vol. xlvii., PINARD reports the experience of the Baudelocque clinic for the year ending December, 1896, in symphysiotomy. During this time 95 patients were confined in the clinic who had some pelvic abnormality. Of these, 68 were delivered spontaneously, while in 27 cases operative interference was practised. Of these, 14 were treated by symphysiotomy and extraction.

These cases are narrated in detail, some of the operations having been performed by other members of the staff. Many of the cases were emergencies, the patients having been brought to the hospital after unsuccessful attempts had been made to deliver with forceps. Several of these cases were multiparæ.

An analysis of these operations shows that seven were done upon primiparæ and seven upon multiparæ. In all the presentation of the fœtus was vertex. Thirteen of these patients had rhachitic pelves and one had a rhachitic pelvis, with luxation of the hip-joint. After the symphysiotomy, 13 of the children were extracted by forceps and one by version. The results were: in 14 cases 12 mothers and 10 children recovered; 2 women and 4 children perished. Of the fatal cases among the mothers, one died of pneumonia, the other died of streptococcus septic infection, autopsies having been held in each case.

The mortality among the children was largely owing to pneumonia, caused by inspiration during prolonged labor.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,

OF NEW YORK.

Extirpation of Diseased Adnexa by Abdominal Section.—BLIESENER (*Monatsschrift für Geb. u. Gynäkologie*, Bd. iii. Heft 6; Bd. iv. Heft 1 and 2) prefers the abdominal to the vaginal route for the removal of diseased adnexa, in spite of the brilliant results claimed for the latter. Not only is troublesome hemorrhage often encountered in the vaginal section, but it is sometimes impossible to remove thoroughly all pus-foci. He cites Bardenheuer's method and statistics (7 deaths in 177 cases), who uses dry sepsis and drains per vaginam, extirpating the uterus when necessary.

Hernia of the Ovary.—BIERMER (*Centralblatt für Gynäkologie*, No. 9, 1897), in reporting two cases of hernia of the ovary, takes occasion to review the literature of the subject quite thoroughly.

As regards the etiology, in 78 reported cases the hernia was congenital in 54, being double in over one-half of these. The writer believes that the congenital anomaly is probably due to the fact that when parts of the Wolffian ducts and gubernaculum of Hunter persist the ovaries do not descend into the true pelvis, but through the abdominal wall into the labia majora, the same as the testicles in the male. If this occurs on both sides, double hernia results, the genital organs being otherwise normal. In cases in which there is also an anomaly of the vagina or uterus, the cause is a defective differentiation of the sex at any early period of fœtal life. In cases of acquired hernia various causes are assigned, such as undue length of the ligamentum ovarii, broad ligaments, and other peritoneal folds. Symptoms may be entirely absent. In most cases there is sensitiveness in the inguinal region, which may later become an unbearable pain. This pain is most severe a few days before menstruation, and is accompanied by increase in the size of the hernia. The pain may be of such a violent and colicky nature as to simulate incarceration. In obscure cases Schröder's recommendation is

a good one: to introduce a sound into the uterus and by moving it to endeavor to move the ovary, which sign is valueless if the latter is adherent. The writer recommends removal of the affected ovary only if it cannot be reduced and becomes diseased or gives rise to severe pain.

The Relation between the Nasal Mucous Membrane and Menstruation.—FLIESS (*Centralblatt für Gynäkologie*, No. 4, 1897) calls attention to the fact that swelling and increased sensitiveness of the nasal mucosa, epistaxis, etc., are often noted during menstruation. Pathological changes in this membrane may cause the "nasal" form of dysmenorrhœa, which is temporarily relieved by cocainizing the nose, and permanently, or for a long period, by cauterizing the nasal mucosa. These "genital spots" in the nose (especially the tubercula sepți) may become affected in scarlatina, diphtheria, or influenza, soon after puberty; the nasal congestion which appears every month at the time of menstruation may fail to be relieved by the monthly flow. The latter condition is also present during pregnancy. Every month the recurring nasal congestion will be observed, which fails to be relieved by the menstrual flow. The writer claims that the pain during the first stage of labor may be relieved by cocainizing the nose the same as in dysmenorrhœa.

Removal of Intrauterine Polypi by Section of the Anterior Uterine Wall.—SCHWARTZ (*Sem. Gyn.; La Gynéco'ogie*, 1897, No. 2) practises the following operation, which he calls "anterior median hysterotomy: preliminary dilatation of the cervix with laminaria tents, or rapid dilatation with Hegar's bougies, and palpation of the intrauterine growth. A semicircular incision is then made in front of the portio and the bladder is dissected away as in vaginal hysterectomy. The cervix is then incised in the median line, and, the flaps being held apart with bullet-forceps, the incision is prolonged upward until the interior of the uterus becomes accessible, care being used not to open the peritoneal cavity. The tumor is drawn downward and removed by torsion, morcellation, or section of the pedicle, as may be required. The curette is used if necessary, the uterine cavity tamponed with gauze, and the wound closed with silk or catgut sutures. After repairing the cervical incision the vaginal wound is sutured and a vaginal tampon is inserted.

Colpocystopexy.—DELBET (*Gaz. des Hôpitaux*, January 19, 1897) described the following procedure for the prevention of the vaginal prolapse which often follows hysterectomy for aggravated procidentia of the uterus. A median longitudinal incision is carried from the junction of the cervix and vagina to a point just above the meatus. A second incision is carried around the cervix anteriorly. Two triangular flaps are dissected off on either side, including the entire thickness of the vaginal wall. Hysterectomy is then performed in the usual manner, with ligatures, but care is taken not to include the round ligaments in the latter. The ligaments are divided and their distal ends are drawn down into the vagina, where they are sutured in the vaginal wound, which is closed. The round ligaments thus form a sort of girth which passes under the bladder and ureters, and the anterior vaginal wall is strengthened, the result being even better than that obtained by colporrhaphy, and without the removal of any tissue.

PÆDIATRICS.

UNDER THE CHARGE OF

LOUIS STARR, M.D.,

OF PHILADELPHIA;

ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,

OF PHILADELPHIA.

Paroxysmal Tachycardia in a Child.—HERRINGHAM (*Transactions of the Clinical Society of London*, January 8, 1897) described the case of a girl, eleven years of age, who for five years had suffered from sudden attacks of tachycardia coming on without determinable cause and lasting for periods varying from thirty-six hours to thirteen days, subsiding usually during sleep. In the course of the attack the pulse was very small and feeble and ranged from 240 to 260. There was slight præcordial discomfort, but no pain; respiration was accelerated, and there was slight cyanosis, but no anasarca or signs of pulmonary œdema. Before her first attack the child had enjoyed robust health. At the time of observation she presented no sign of valvular lesion, but the volume of the heart was increased, suggesting the possibility of a lesion of the myocardium or pericardial adhesions. In the previous history there was no preceding attack of rheumatism, nor sign of hereditary syphilis. All means of treatment in this case seemed without benefit.

The Red Blood-corpuscle in Icterus Neonatorum.—KOSPFELMACHER (*Wiener medicinische Wochenschrift*, No. 43, 1896, S. 976) has made a study of this subject based upon twelve cases of icterus neonatorum observed in the clinic of Professor Schauta, with the following conclusions: 1. The number of red corpuscles found in the blood of newborn infants during the first week of life is not influenced by icterus. 2. The resistance of the corpuscles at birth is equal to that of the corpuscle in the adult, and is not modified during the first eight days by icterus, even of intense degree. 3. Microscopic examination of the blood of the newborn in the first days of life shows no sign of destruction of blood-corpuscles. It shows, on the contrary, the existence of a very active new formation of the red corpuscles.

Pseudo-bulbar Paralysis in Childhood.—BRAUER (*Deutsche Zeitschrift f. Nervenheilkunde*, 1897, S. 416) records an interesting case under this title in a girl fourteen years of age, who, at the age of eleven months, had a feverish attack with convulsions, which disappeared at the end of some days, leaving a symmetrical paralysis of the tongue and lips, with anæsthesia and dysphasia of mean intensity, and a hemiparesis of the right side with arrest of development of the arm.

At the author's examination there was noted to be a paralysis of the orbicularis oris, of the pterygoids, of the tongue and vulva. The paralyzed muscles showed no atrophy, fibrillary contractions, reaction of degeneration, or disturbances of sensation. The masseteric reflex was exaggerated, the phar-

yngeal reflex wanting The right arm was slightly shorter and weaker than the left; the right leg showed a slight paresis in the muscles supplied by the sciatic and peroneal nerves, with exaggerated knee-jerks. The principal phenomena were, therefore, those of a bulbar paralysis, but did not partake of the character of the progressive bulbar paralysis of Duchenné, since muscular atrophy and a slowly progressive course were absent. In the same way, polyneuritis, foci of inflammation, or softening in the bulb, and lesion of the muscles could be excluded, so that the author concluded that the lesion was supranuclear, or, in other words, that the condition was a pseudo-bulbar palsy.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

JOHN SLADE ELY, M.D.,

PROFESSOR OF PATHOLOGY IN THE WOMAN'S MEDICAL COLLEGE OF THE NEW YORK INFIRMARY; INSTRUCTOR IN CLINICAL MICROSCOPY IN THE COLLEGE OF PHYSICIANS AND SURGEONS.

Summer Diarrhœas of Infants.—In a recent article entitled "A Bacteriological and Anatomical Study of the Summer Diarrhœas of Infants" BOOKER has added much to our knowledge of these disorders, not only as to their etiology, but as to the structural changes in the intestine incident to many of them, which at times prepare the way for general systemic infection.

Careful bacterial examinations of the stools were made in ninety-two different cases of various degrees of intensity, and in the fatal cases similar examinations of the intestinal contents and of the various internal organs were coupled with histological examinations with a view to determining the relation of the intestinal infections and lesions to the remoter changes in the body. As this represents the most exhaustive study of this subject which has yet been made, it seems proper to present the results somewhat in detail.

It was made clearly apparent by the study of the stools that no single species of micro-organism was responsible for the disease, and also, in a general way, that the character of the passages and the nature of the systemic disturbance conform to the character of the intestinal infection. The cases thus arrange themselves in four rather distinct groups.

In a considerable number of the cases the obligatory milk-feces bacteria were found to be the chief bacterial ingredient of the stools. These were for the most part mild cases, of short duration, and usually without apparent toxic symptoms. The stools were sometimes very frequent, were usually acid in reaction, and lacked uniformity of consistence, having been often lumpy. They contained no leucocytes. Twenty-four cases of this type were studied. Bacillus coli communis and bacillus lactis aërogenes preponderated. Other bacteria when present appeared in very small numbers and were apparently insignificant. In all these cases bacillus coli preponderated in the stools over bacillus lactis.

In another set of cases, represented by six only of the ninety-two, while

the obligatory milk-feces bacteria were greatly increased in number, the inconstant bacteria of the normal intestinal contents preponderated and appeared to play an important *rôle* in the induction of the symptoms. Thus, in three of the cases "bacillus a" was the most notable feature, and in one each "bacillus X," "bacillus y," and "bacillus d." It will be remembered that these are the designations applied by Booker to four of the numerous inconstant milk-feces bacteria of infants described by him in a former paper, several of which were found to be pathogenic to animals, and have since been shown by Vaughan to elaborate toxic substances when grown in broth. These cases were all severe and presented evident toxic symptoms. The stools were frequent in some, infrequent in others, and varied much in consistence. They often had a decidedly putrid odor. One of these cases in which "bacillus X" preponderated was fatal.

A third set of cases, comprising thirty-five, was characterized by enormous numbers of bacilli in the stools, among which proteus vulgaris was always found in large numbers. The ordinary obligatory milk-feces bacteria were also constantly present in very great excess of the normal, and in many of the cases a few streptococci and some other inconstant forms were also present. As would be expected from the large numbers of bacteria present, these were serious cases, usually chronic if not fatal, and characterized by emaciation and toxic symptoms. The stools were, as a rule, liquid, yellow or green in color, putrid, and neutral or alkaline in reaction. They seldom, however, contained mucus, leucocytes, or epithelium.

In the fourth and last set of cases, twenty-seven in number, micrococci preponderated in the stools, though in addition bacillus coli was present in increased number in all the cases, bacillus lactis in fourteen, and proteus vulgaris in four. The micrococci were for the most part streptococci. These cases were uniformly severe, and gave evidence of marked toxic disturbance. The stools were, as a rule, very frequent, often more than twenty in the twenty-four hours. They were soft or liquid, often greenish, and usually contained mucus and leucocytes in abundance. They were also at times very offensive. Though very numerous, the bacteria were not present in the stools in the enormous numbers met with in the third set of cases. Stained cover-glass preparations also showed them to be chiefly micrococci, not bacilli, as in the former cases. A general pyæmic infection was a not infrequent outcome of these cases.

In connection with these results of bacteriological examinations of the stools the pathological findings in the fatal cases are of great interest. Autopsies were performed in many cases within an hour after death, thus anticipating as far as possible putrefactive changes in the tissues.

Bacterial examinations of the intestinal contents showed a more uniform distribution of the obligatory milk-feces bacteria throughout the gut than is the case in the intestine of the normal milk-fed infant. It will be remembered that attention was drawn by Escherich to the fact that in the normal child the upper part of the small intestine is inhabited almost exclusively by bacillus lactis, the bacillus coli communis appearing in large numbers only in the lower portion of the ileum, and increasing in number coincidently with a decrease in number of the bacillus lactis as the feces pass downward, until in the colon bacillus coli becomes the preponderating species. This relation of the two species is lost in diarrhœal disorders. Both are

usually present in vastly increased numbers in all parts of the intestinal tract, though usually bacillus coli would seem to have undergone the greatest increase. In the cases in which proteus vulgaris and streptococci were found in the stools during life the same germs were also found in the intestinal contents in large numbers.

The anatomical changes in the intestine and in the internal organs were found to accord in general with the severity of the disease and with the known pathological effects of the bacteria preponderating in the stools in the different cases. In the milder cases and in the majority of those composing the first three groups little or no change was noted in the intestinal mucous membrane, and the change in the internal organs was limited for the most part to parenchymatous degeneration. In the severer cases of the third group, and in most of the fourth set of cases, however, extensive inflammatory and ulcerative changes were present in the intestine, and in these lesions were large numbers of bacteria of the same species as those found in the intestinal contents. In these cases, also, the internal organs frequently showed the existence of serious complications, notably pneumonia, in the lesion of which the same germs again appeared. And even when no visible secondary lesion of this sort was apparent, bacteriological examination invariably in these cases demonstrated the presence of one or other of the intestinal species in at least one of the internal organs.

From these results the conclusion appears to be irresistible that the intestinal disorders of children are to be attributed to no one specific form of bacteria. That in many cases the actual damage is done more by the products of the bacterial growth than by the germs themselves seems clear, since we know that these products are often strongly toxic, and since in many even fatal cases no penetration of the body-tissues by the bacteria can be demonstrated. In the milder forms of these disorders it is not unlikely that the acids which Baginsky has shown are generated by the obligatory milk-feces bacteria in moderate quantity even under normal conditions may be the irritant of the intestinal mucous membrane chiefly responsible for the symptoms, and this conception seems fully in accord with the decided acidity of the stools in these cases. In the severer cases, and particularly when pyogenic or necrotizing species of bacteria are present, distinct inflammatory changes in the intestinal mucosa are usually present and seem often to permit the entry of the bacteria to the underlying tissues, whence they may be disseminated throughout the body and induce a general pyæmic condition of which pneumonia is a not infrequent manifestation.—*Johns Hopkins Hospital Reports*, 1896, vi. 159.

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All communications should be addressed to

DR. EDWARD P. DAVIS, 250 South 21st Street, Philadelphia, U. S. A.

Or

DR. HECTOR MACKENZIE. 5*a* Welbeck St., Cavendish Sq., London, W., Eng.

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